TOSHIBA

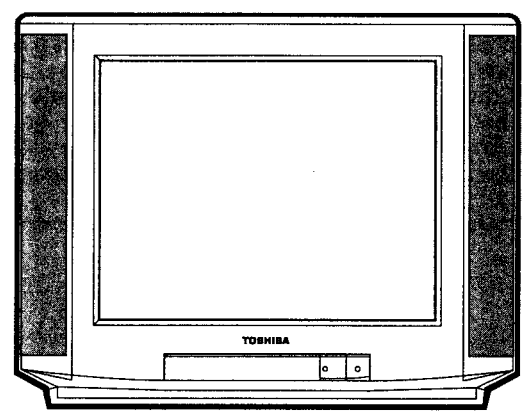
FILE NO. 030-9624

SERVICE MANUAL

COLOUR TELEVISION

C6S Chassis

2163DN



PRINTED IN JAPAN, Sep., 1996 (So)

SAFETY INSTRUCTIONS

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" INSTRUCTIONS BELOW.

X-RAY RADIATION PRECAUTION

1. The E.H.T. must be checked every time the receiver is serviced to ensure that the C.R.T. does not emit X-ray radiation as result of excessive E.H.T. voltage. The nominal E.H.T. for this receiver is 28.1 kV at zero beam current (minimum brightness) operating at 220V a.c. The maximum E.H.T. voltage permissible in any operating circumstances must not exceed 29.5 kV. When checking the E.H.T., use the 'High Voltage Check' procedure in this manual using an accurate E.H.T. voltmeter.
2. The only source of X-RAY radiation in this receiver is the C.R.T. To prevent X-ray radiation, the replacement C.R.T. must be identical to the original fitted as specified in the Parts List.
3. Some components used in this receiver have safety related characteristics preventing the C.R.T. from emitting X-ray radiation.
   For continued safety, replacement component should only be made after referring the Product Safety Notice below.

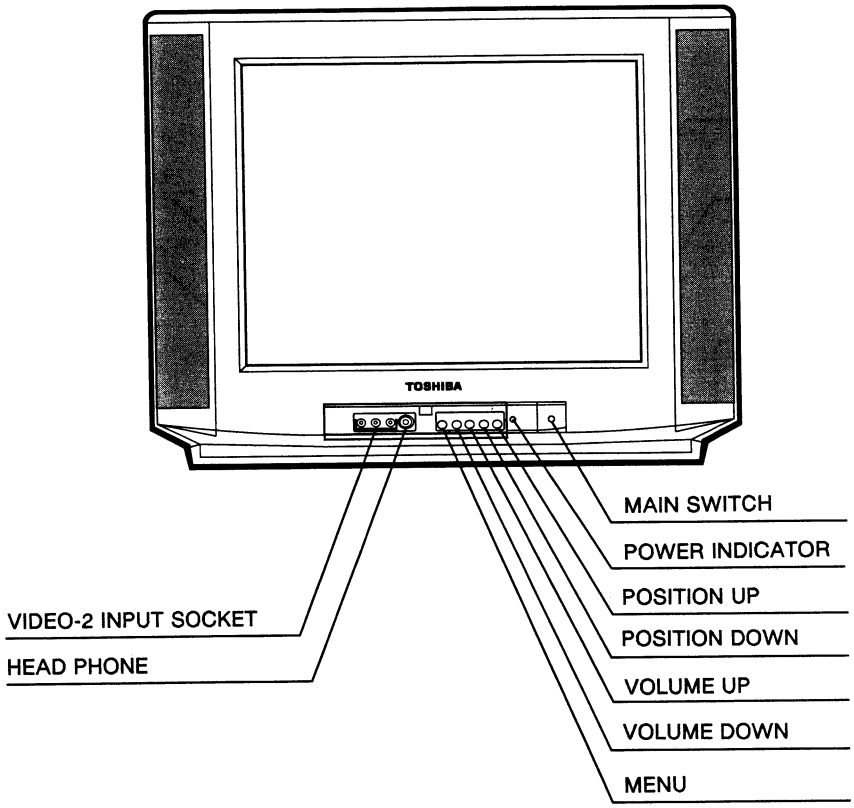
SAFETY PRECAUTION

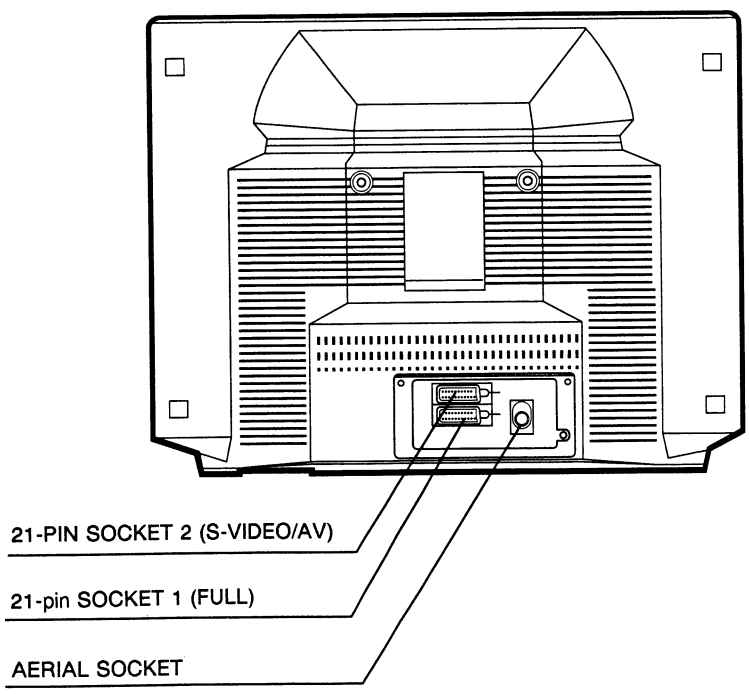
1. This receiver has a nominal working E.H.T. voltage of 26.0 kV. Extreme caution should be exercised when working on the receiver with the back removed.
   Do not attempt to service this receiver if you are not conversant with the precautions and procedures for working on high voltage equipment.
   When handling or working on the C.R.T., always discharge the anode to the receiver chassis before removing the anode cap
   The C.R.T., if broken, will violently expel glass fragments. Use shatter proof goggles and take extreme care while handling.
   Do not hold the C.R.T. by the neck as this is a very dangerous practice.
2. It is essential that to maintain the safety of the customer all cable forms be replaced exactly as supplied from factory.
3. A small part of the chassis used in this receiver is, when operating, at approximately half mains potential at all times. It is therefore essential in the interest of safety that when serving or connecting any test equipment the receiver should be supplied via a suitable isolating transformer of adequate rating.
4. Replace blown fuses within the receiver with the fuse specified in the parts list.
5. When replacing wires or components to terminals or tags, wind the leads around the terminal before soldering. When replacing safety components identified by the international hazard symbols on the circuit diagram and parts list, it must be a Toshiba approved type and must be mounted as the original.
6. Keep wires away from high temperature components.

PRODUCT SAFETY NOTICE

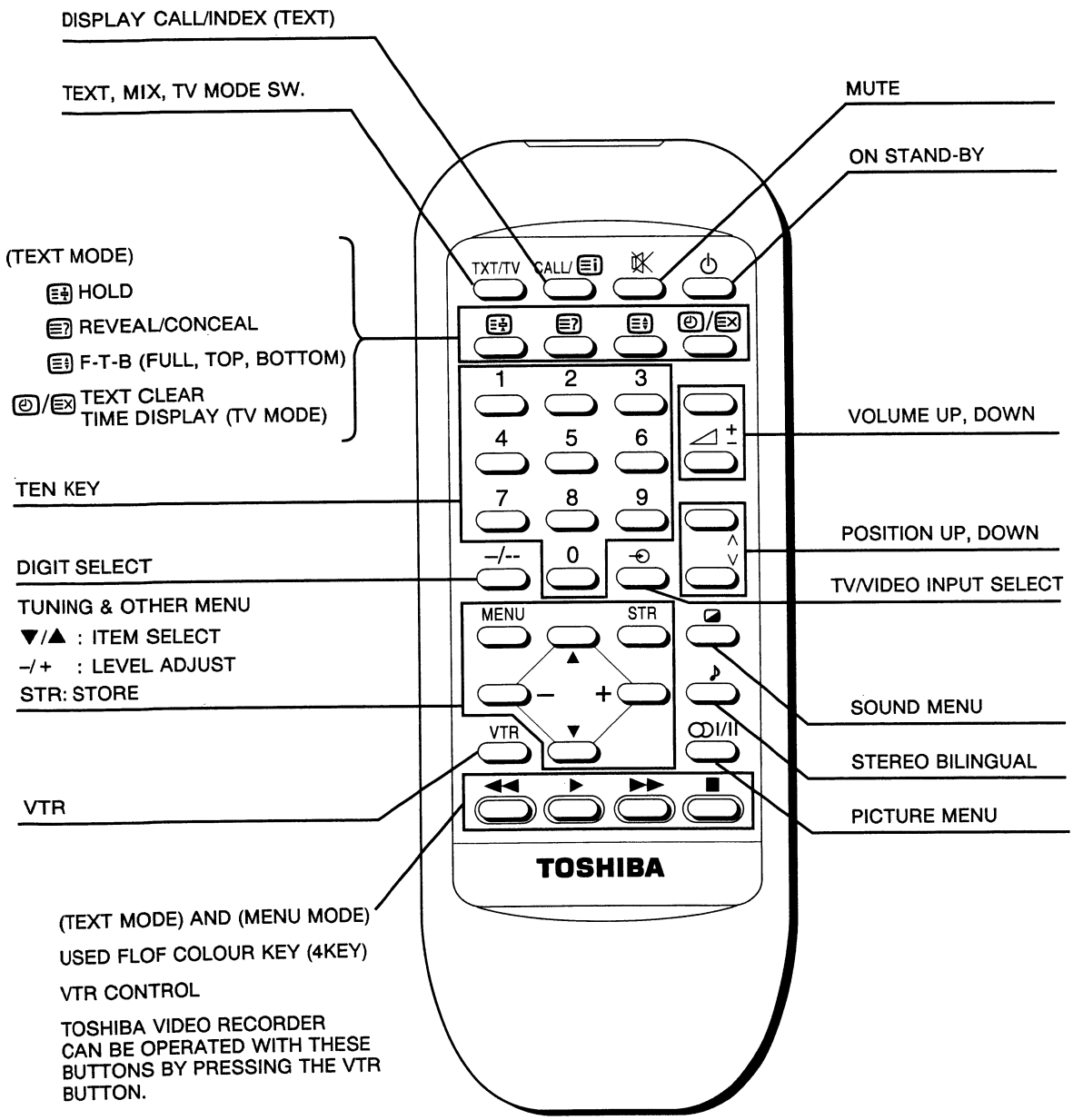
Many electrical and mechanical components in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-ray radiation protection afforded by them cannot necessarily be obtained by using replacements rated at higher voltages or wattage, etc. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols on the schematic diagram and parts list. Before replacing any of these components read the parts list in this manual carefully. Substitute replacement components which do not have the same safety characteristics as specified in the parts list may create X-ray radiation.

FRONT CONTROLS AND REAR VIEWS

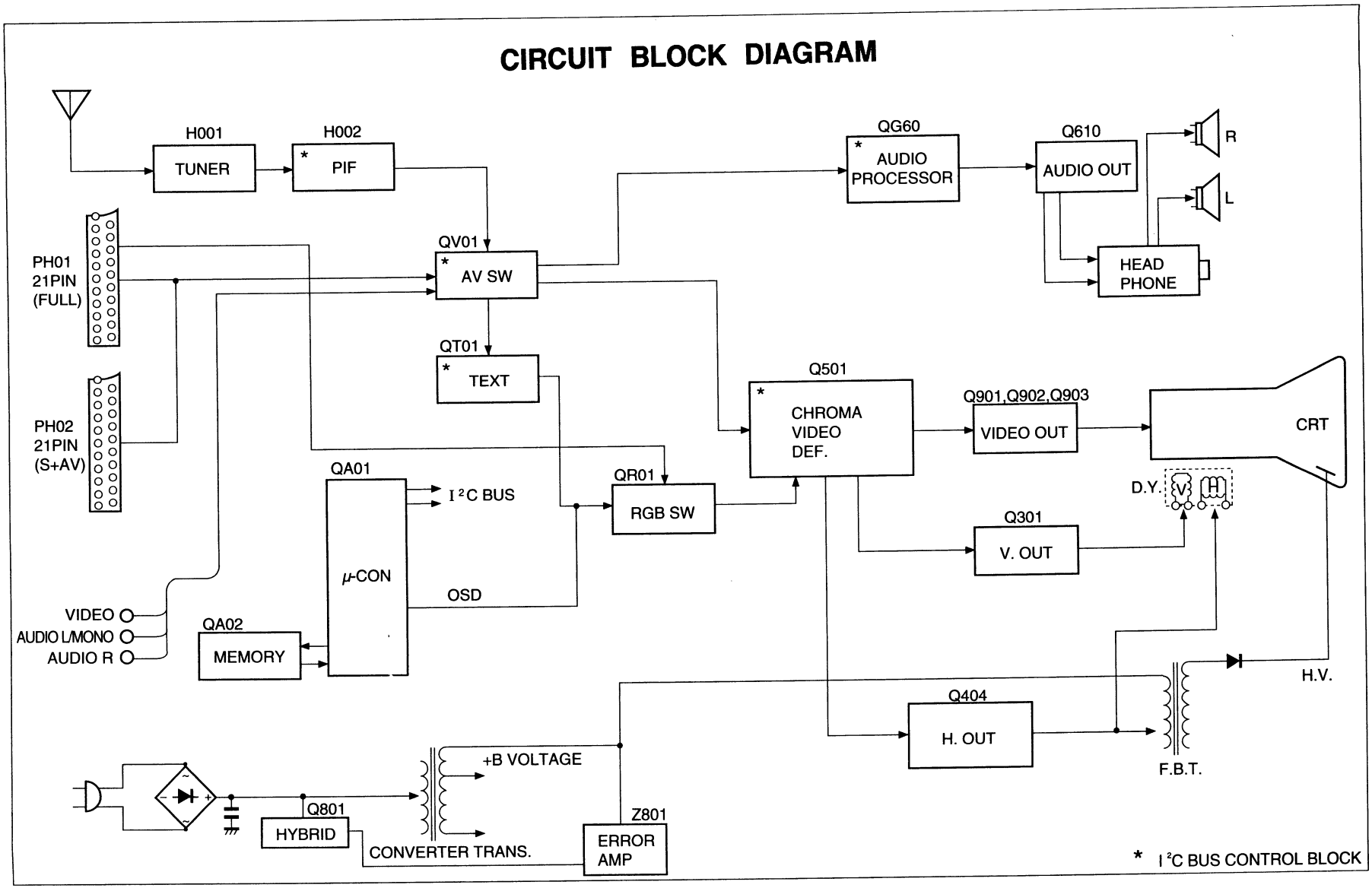




REMOTE HAND HELD UNIT



CIRCUIT BLOCK DIAGRAM



WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

INSTALLATION AND SERVICE ADJUSTMENTS

GENERAL INFORMATIONS

All adjustments are thoroughly checked and corrected when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W pictures upon installation. However, several minor adjustments may be required depending on the particular location in which the receiver is operated.
This receiver is shipped completely in cardboard carton. Carefully draw out the receiver from the carton and remove all packing materials. Plug the power cord into a convenient 220 volts 50 Hz AC two pin power outlet. Turn the receiver ON. Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR Controls to obtain natural colour or B/W picture.

AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that external degaussing after moving the receiver is normally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the receiver is switched ON. If the set is moved or faced in a different direction, the power switch must be switched off at least 30 minutes in order that the automatic degaussing circuit operates properly. Should the chassis or parts of the cabinet become magnetized to cause poor colour purity, use an external degaussing coil. Slowly move the degaussing coil around the faceplate of the picture tube, the sides and front of the receiver and slowly withdraw the coil to a distance of about 2 m before disconnecting it from AC source. If colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures.

HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis.

1. Connect an accurate high voltage meter to the second anode of the picture tube.
2. Turn on the receiver. Set the BRIGHTNESS and CONTRAST Controls to minimum (zero beam current).
3. High voltage will be measured below 29.5 kV.
4. Rotate the BRIGHTNESS Control to both extremes to be sure the high voltage does not exceed the limit of 29.5 kV under any conditions.

FOCUS ADJUSTMENT

Adjust FOCUS Control on FLYBACK TRANS. (T461) for well defined scanning lines in the centre area on the screen.

SET-UP ADJUSTMENT

- The following adjustments should be made when a complete realignment is required or a new picture tube is installed.
  Perform the adjustments in order as follows :
  1. Color Purity
  2. Convergence
  3. White Balance (See page 13.)
  Note: The PURITY/CONVERGENCE MAGNET assembly and rubber wedges need mechanical positioning.
  Refer to figure 1.

COLOR PURITY ADJUSTMENT

NOTE : Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes.

1. Demagnetize the picture tube and cabinet using a degaussing coil.
2. Set the brightness and contrast to maximum.
3. Use a green raster from among the built-in test signals. See page 12.
4. Loosen the clamp screw holding the yoke and slide the yoke backward or forward to provide vertical green belt (zone) in the picture screen.
5. Remove the Rubber Wedges.
6. Rotate and spread the tabs of the purity magnet (See figure 2.) around the neck of the picture tube until the green belt is in the center of the screen. At the same time, enter the raster vertically.
7. Slowly move the yoke forward or backward until a uniform green screen is obtained. Tighten the clamp screw of the yoke temporarily.
8. Check the purity of the red and blue raster.

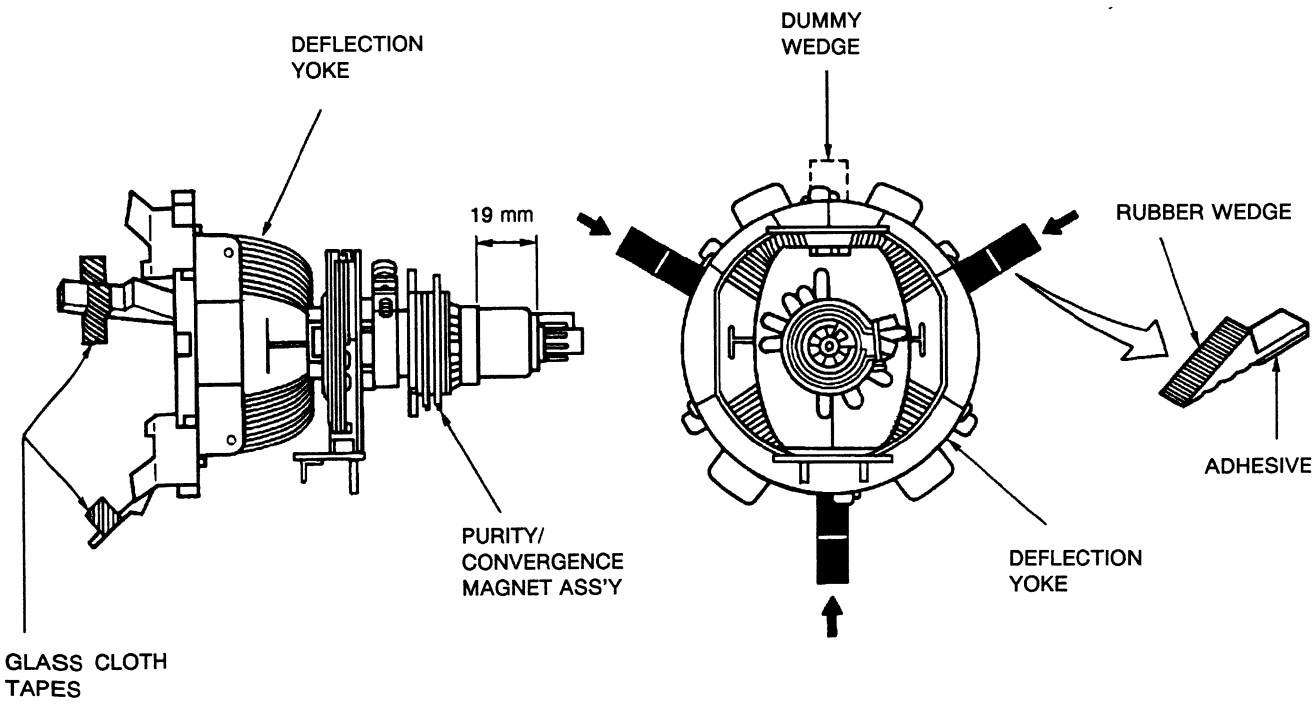


Figure 1.

CONVERGENCE ADJUSTMENTS

NOTE: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

■ CENTER CONVERGENCE ADJUSTMENT

1. Use the cross-dot pattern from among the built-in test signals. See page 12.
2. Set the brightness and contrast for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 2.) and superimpose red and blue vertical lines in the center area of the picture screen.
4. Turn the both tabs at the same time keeping the angle constant to superimpose red and blue horizontal lines at the center of the screen.
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line and green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3, 4, 5 keeping in mind red, green and blue movement, because 4-Pole Magnets and 6-Pole Magnets have mutual interaction and make dot movement complex.

■ CIRCUMFERENCE CONVERGENCE ADJUSTMENT

1. Loosen the clamping screw of deflection yoke slightly to allow the yoke to tilt.
2. Temporarily put a wedge as shown in figure 1. (Do not remove cover paper on adhesive part of the wedge.)
3. Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See figure 3.) Push the mounted wedge into the space between picture tube and the yoke to fix the yoke temporarily.
4. Put other wedge into bottom space and remove the cover paper to stick.
5. Tilt front of the yoke right or left to obtain better convergence in circumference. (See figure 3.)
6. Keep the yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on picture tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke.
8. After fixing three wedges, recheck overall convergence.
   Tighten the screw firmly to fix the yoke and check the yoke is firm.
9. Stick three adhesive tapes on wedges as shown in figure 1.

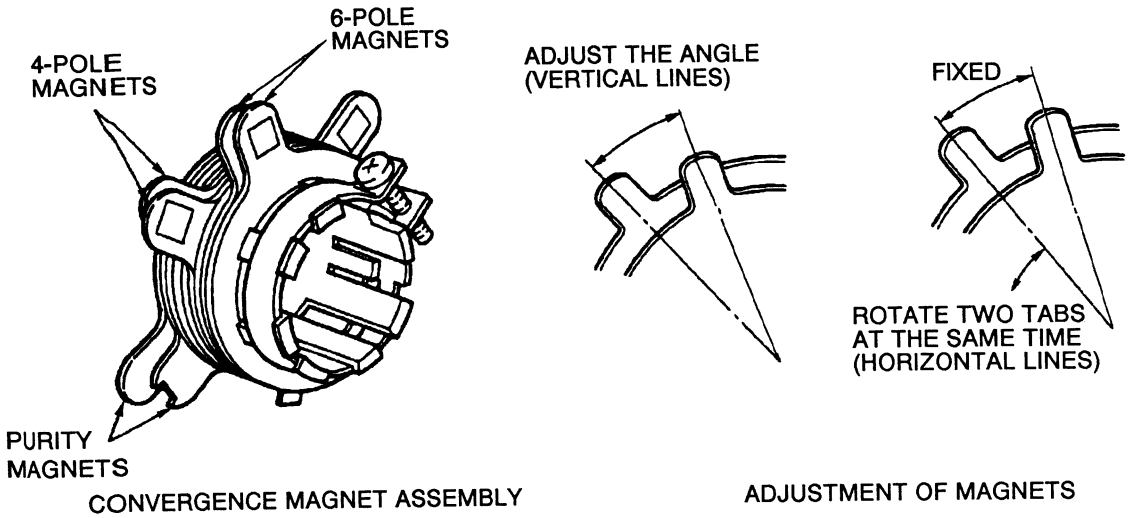
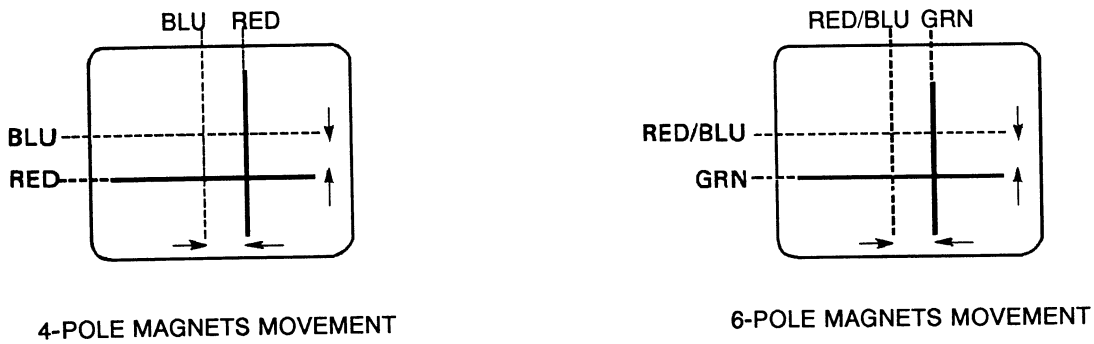


Figure 2.



Center Convergence by Convergence Magnets

Circumference Convergence by DEF Yoke

Figure 3. Dot Movement Pattern

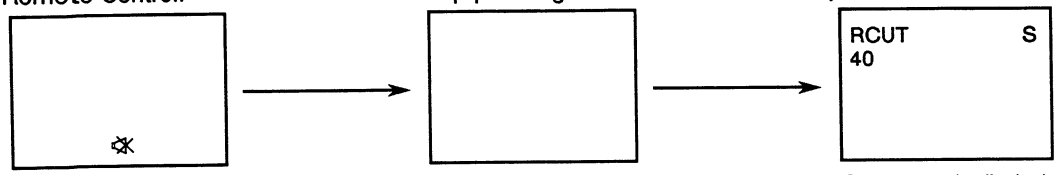
SERVICE MODE

1. ENTERING TO SERVICE MODE

1) Press ✲ button once on Remote Control.

2) Press ✲ button again to keep pressing.

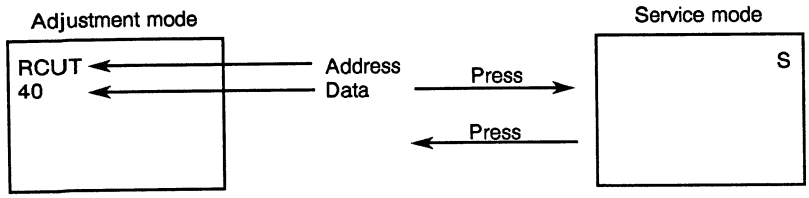
3) Keep pressing the ✲ button, press MENU button on TV set.



(Service mode display)

2. DISPLAYING THE ADJUSTMENT MENU

Press MENU button on TV.



3. SELECTING THE ADJUSTING ITEMS

Every pressing of CHANNEL ▲ button changes the adjustment items in the following order. (▼ button for reverse order.)

4. ADJUSTING THE DATA

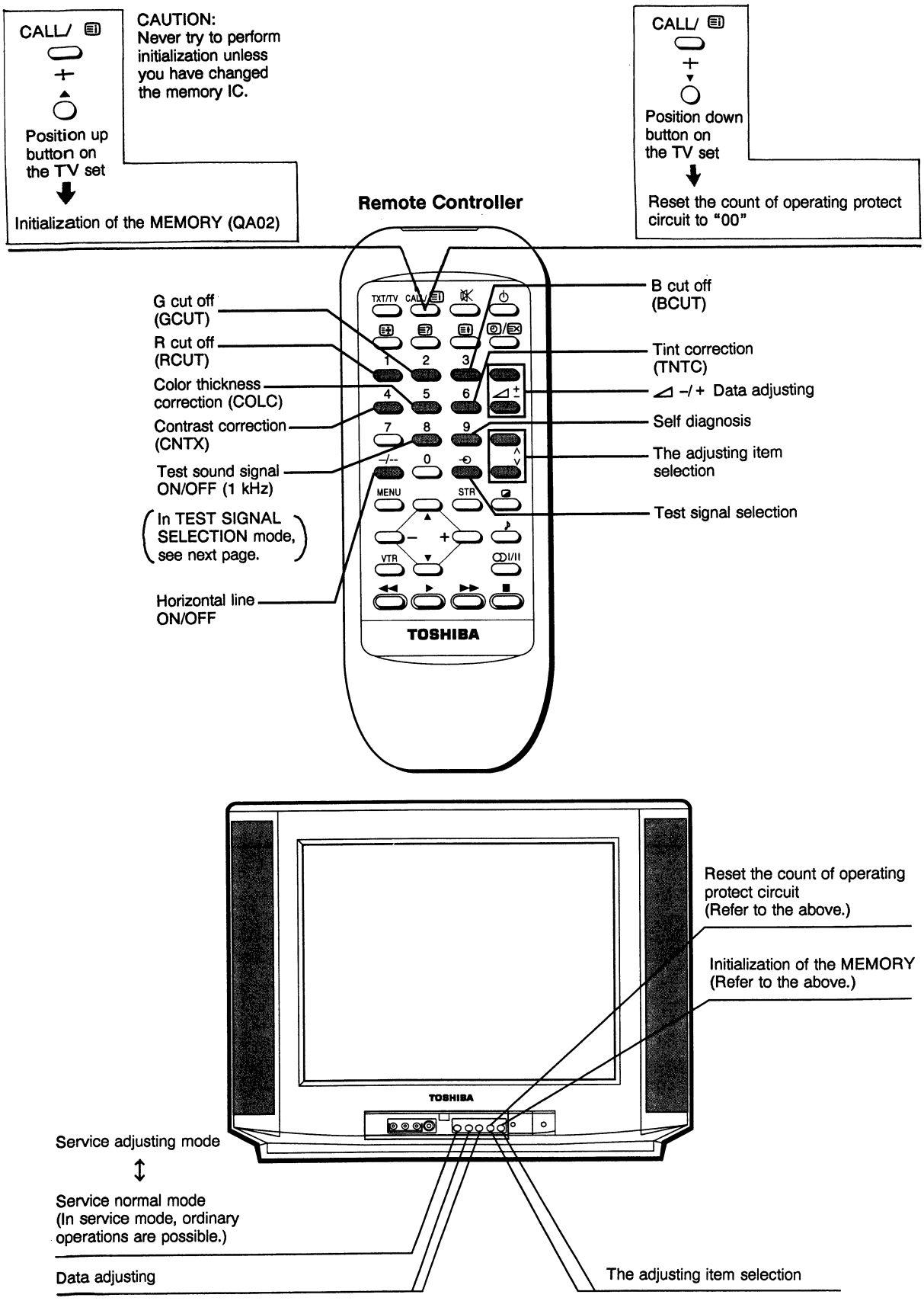
Pressing of VOLUME ▲ or ▼ button will change the value of data in the range from 00 to FF. The variable range depends on the adjusting item.

5. EXIT FROM SERVICE MODE

Press POWER button to turn off the TV once.

OTHER SERVICE FUNCTION

The following key entry during display of adjustment menu provides special functions.


CALL/
+
Position up button on the TV set
Initialization of the MEMORY (QA02)
CAUTION:
Never try to perform initialization unless you have changed the memory IC.
CALL/
+
Position down button on the TV set
Reset the count of operating protect circuit to "00"
Remote Controller
G cut off (GCUT)
R cut off (RCUT)
Color thickness correction (COLC)
Contrast correction (CNTX)
Test sound signal ON/OFF (1 kHz)
In TEST SIGNAL SELECTION mode, see next page.
Horizontal line ON/OFF
B cut off (BCUT)
Tint correction (TNTC)
-/+ Data adjusting
Self diagnosis
The adjusting item selection
Test signal selection
TOSHIBA
Reset the count of operating protect circuit (Refer to the above.)
Initialization of the MEMORY (Refer to the above.)
Service adjusting mode
Service normal mode (In service mode, ordinary operations are possible.)
Data adjusting
The adjusting item selection

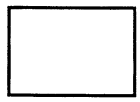
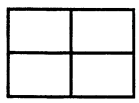
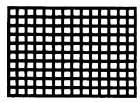
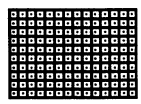
TEST SIGNAL SELECTION

Every pressing of ⊕ button changes the test patterns on screen as described below in SERVICE MODE.

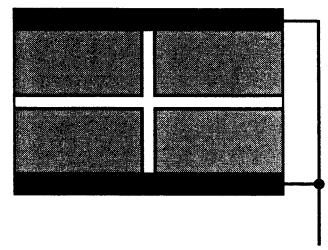
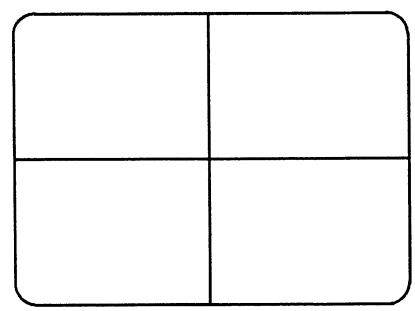
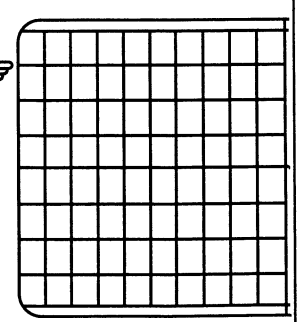
Signal off → NTSC signals (14 patterns)

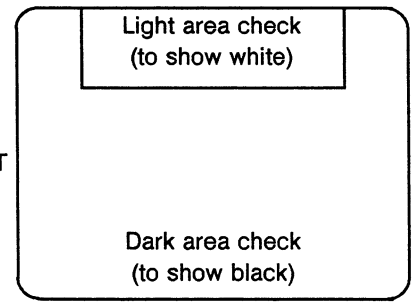
↑ PAL signals (14 patterns) ←

- About inside signal: The inside signal is output at video input terminal from QA01, and is not output with the pin inserted into terminal. (Single color signal can be output.)

Signals	Picture	Using method
• Black single color • White single color		Purity and White uniformity of CRT Black single color. . . . Making black signal of approx. 1Vp-p in QA01 White single color. . . . Making white signal of approx. 1Vp-p in QA01
• W/B adjustment		White balance adjustment White part. . . . White balance adjustment/check in light area Black part. . . . White balance adjustment/check in dark area ※ Making approx. 1Vp-p signal in QA01.
• Black cross-bar • White cross-bar		Picture position (horizontal, vertical and slant) in CRT adjustment ※ Making approx. 1Vp-p signal in QA01.
• Black cross-hatch • White cross-hatch		Convergence and vertical amplitude adjustment ※ Making approx. 1Vp-p signal in QA01.
• Black cross-dot • White cross-dot		Convergence adjustment ※ Making approx. 1Vp-p signal in QA01.
• H signal (Left, right, white) • H signal (Left, right, black)		For checking (of purity drift) of white uniformity of CRT H signal (Left, right, white). . . . Check in light area H signal (Left, right, black). . . . Check in dark area The adjustment will be the best, if the time when unevenness of color in light area occurs, is a little longer than that in dark area. ※ Making approx. 1Vp-p signal in QA01.

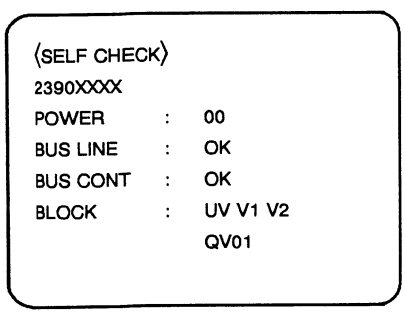
ELECTRICAL ADJUSTMENT

ITEM	ADJUSTMENT PROCEDURE
SUB-BRIGHTNESS (BRTC) Note: Constrict the picture height until the vertical retrace line appears adjusting the address HIT (HEIGHT).	1. Set CONTRAST to "00", and BRIGHTNESS to "50" by adjusting user controls. 2. Set the TV in service mode to get white cross-bar of inside pattern. 3. Select BRTC (brightness correction), and adjust the ◿ – / + button to reduce the value so that white portion of inside pattern slightly light. 4. Adjust ◿ – / + button to increase the data value of BRTC, and set it just before the difference between the belt of vertical retrace and the border of black portion of inside pattern is visible. After that, return vertical height and contrast.  Belt of vertical retrace
HORIZONTAL POSITION ADJUSTMENT (HPOS) VERTICAL POSITION ADJUSTMENT (VPOS)	1. Set the TV in service mode, and get black or white cross-bar signal with VIDEO button on remote hand unit. 2. Select either HPOS (Horizontal picture phase) or VPOS (Vertical picture phase) with CHANNEL ▲, ▼ buttons, and adjust horizontal or vertical picture position in the center of screen with VOLUME ◿ – / + buttons. 
VERTICAL AMPLITUDE ADJUSTMENT (HIT)	1. Set the TV in service mode, and get black or white cross-hatch signal with VIDEO button on remote hand unit. 2. Select HIT (Vertical amplitude) with CHANNEL ▲, ▼ buttons, and adjust vertical amplitude with VOLUME ◿ – / + buttons so that vertical amplitude lacks a little. 3. Adjust vertical amplitude with VOLUME ◿ – / + buttons so that the first bar on cross-hatch signal touches edge of screen. The first ☞ 
WHITE BALANCE ADJUSTMENT • CUTOFF ADJUSTMENT (RCUT) (GCUT) (BCUT) • DRIVE ADJUSTMENT (GDRV) (BDRV)	1. Set Contrast to 40, and brightness to +20 by picture control. 2. Set the TV in service mode, and get the inside W/B adjusting signal with VIDEO button (see pages 10, 12.). 3. Select RCUT, GCUT and BCUT with CHANNEL ▲, ▼ buttons, to set individual values to 32, and to set GDRV and BDRV to 20 with VOLUME ◿ – / + buttons. 4. Press [/--] button on the remote control and rotate Screen VR to get one slight horizontal line on screen. Note: Every pressing of [/--] button provides Horizontal line picture and Normal picture alternately.

ITEM	ADJUSTMENT PROCEDURE
	5. Press [+/-] button to release horizontal line picture, and select the two other colors which did not light in the above step with CHANNEL ▲, ▼ buttons. Then tap VOLUME ◿ – / + buttons so that three colors slightly light in the same level. ※ To correct white balance in light area, select GDRV and BDRV with CHANNEL ▲, ▼ buttons to adjust. ※ To correct white balance in dark area, perform fine adjustment of RCUT, GCUT and BCUT. 

SELF DIAGNOSTIC FUNCTION

1) Press "9" button on Remote Control during display of adjustment menu.
   The diagnosis will begin to check if interface among IC's are executed properly.
2) During diagnosis, the following displays are shown.



① Part number of microcomputer (QA01)
② Operation number of protecting circuit ----"00" is normal.
When indication is other than "00", overcurrent apts to flow, and circuit parts may possibly be damaged.
③ BUS LINE CHECK ----"OK" is normal.
"SDA1–GND" means that SDA line is shorted to ground.
"SCL1–GND" means that SCL line is shorted to ground.
"SCL1–SDA1" means that SDA line is shorted to SCL line.
④ BUS CONT ----"OK" is normal.
When indication shows "Q○○○ NG", the device with the number may possibly be damaged.
⑤ BLOCK
UV : TV reception mode
V1 : VIDEO 1 input mode (⇒ 1)
V2 : VIDEO 2 input mode (⇒ 2)

Indicated color of mode now selected : Green and Red
Indicated color of other modes : White

Green : Normal
Red : The microcomputer operates to provide judgement of no video signal. The red color is still indicated though the signal is input, failure may exist in input signal line including QV01.
QV01 : In case of indication green ---Normal
In case of indication red with input signal----
Failure may exist in output line including QV01.

NOTE: Component which controls character display on screen is QT01 (TELETEXT IC). If this display function fails to operate due to damage in QT01, self diagnosis procedure is as follows.
(1) In case that power indicator is blinking with interval of 0.5 seconds; it means protecting circuit (Current limiter) is operating, and circuit components may possibly be damaged. Check related components.
(2) In case that power indicator is blinking with interval of 1 second; Protecting circuit does not operate, but a part of Bus line does not operate normally. Check Bus line.

ADJUSTMENT OF VIDEO-CHROMA SYSTEM (Factory adjustment)

Item	Name	Setting (User control)	Input signal	Measurement point	Adjustment procedure	Adjustment standard
Slave address 36 [BRTC]	SUB BRIGHT CENTER	Contrast: MAX Bright : CENTER Color : MIN	Sub-bright signal	Screen adjustment	1. This adjustment must be done after [BRTC], screen VR and white balance adjustments have been completed. 2. Adjust number of black collapse lines of sub-bright signal.	4 ± 1.5
Slave address 3B [SCNT]	SUB CONTRAST	Contrast: MAX Bright : CENTER Color : MIN	Sub-bright signal (PAL)	IC501 #12... (B-OUT)	1. Select slave address 3B [SCNT]. 2. When [SCNT] is selected, Q-signal is muted and only B/W signals are outputted. 3. Adjust amplitude of white level from pedestal level of Y-signal.	1.25V(p-p) ±0.15V(p-p)
Slave address 20 [RCUT] 31 [GCUT] 32 [BCUT] Screen VR	R cut-off G cut-off B cut-off Screen	RCUT, GCUT, BCUT) 40 Hexa-decimal GDRV, BDRV) 80 Hexa-decimal Select horizontal line mode by pressing [-/--] button on the remote control in service mode.		Screen adjustment	1. Set the controls as shown in the left column. 2. Gradually increase the screen VR (T461) until one of R, G or B line begins to brighten slightly. 3. Determine the position of the screen VR here. 4. Adjust RCUT, GCUT and BCUT, brighten other lines until they begin to light slightly. (Adjust DATA so that the line becomes almost white.) 5. Press [-/--] button on the remote control to escape from the horizontal line mode.	—
Slave address 30 [RCUT] 31 [GCUT] 32 [BCUT] 33 [GDRV] 34 [BDRV]	R cut-off G cut-off B cut-off G drive B drive (White balance)	Contrast: MAX Bright : CENTER Color : CENTER	White, etc.	Screen adjustment	1. This adjustment must be done after adjustment of the above-mentioned cut-off and screen VR's have been completed. 2. Adjust cut-off and drive DATA alternately. 3. Use a checker to adjust brightness by changing modulation factor.	HIGH LIGHT; (103cd/m^3) 8750K –0.002uv DARK; (17cd/m^3) 8750K –0.002uv
Slave address 37 [COLC]	SUB COLOR CENTER	Contrast: MAX Bright : CENTER Color : CENTER	Sub-bright signal	Pin 12 of IC501	1. Select slave address 37 [COLC]. 2. When [COLC] is selected, Y-signal is muted only color signals are outputted. 3. Adjust amplitude of the upper half of the-color bar output.	1.25V $(_{p\text{-}p})$ ±0.15V $(_{p\text{-}p})$
Slave address F1 [TRP]	Chroma trap f_0 adjusting	Contrast: MAX Bright : MIN Color : MIN	PAL color bar	Pin 12 of IC501 (B-OUT)	1. Select slave address F1 [TRP]. 2. Adjust chroma trap so that chroma level at pin 12 of IC501 becomes minimum.	Chroma level: MIN

SELECTING THE ADJUSTING ITEMS

1) Every pressing of CHANNEL ▲ button changes the adjustment items in the following order. (▼ button for reverse order.)

Adjusting method	QA02 memory address	Name of item	Comment	Preset data (H)	2163DB data (H)	2163DD Data (H)	2163DF data (H)
F	06BH	RCUT	(30) : R CUTOFF	40	←	←	←
F	06CH	GCUT	(31) : G CUTOFF	40	←	←	←
F	06DH	BCUT	(32) : B CUTOFF	40	←	←	←
F	06EH	GDRV	(33) : G DRIVE	80	←	←	←
F	06FH	BDRV	(34) : B DRIVE	80	←	←	←
S	070H	CNTX	(35) : SUB CONTRAST MAX	FF	←	←	←
F	071H	BRTC	(36) : SUB BRIGHT CEN	80	←	←	←
F	072H	COLC	(37) : SUB COLOR CEN NTSC	80	←	←	←
S	073H	TNTC	(38) : SUB TINT CEN	40	←	←	←
S	074H	COLP	(39) : SUB COLOR CEN PAL (DIFFERENCE)	00	←	←	←
S	075H	COLS	(3A) : SUB COLOR CEN SECAM (DIFFERENCE)	00	←	←	←
F	076H	SCNT	(3B) : Y-SUB CONTRAST	0C	←	←	←
F	093H	HPOS	(80) : 50Hz H-POSITION	05	←	←	←
F	094H	VPOS	(81) : 50Hz V-POSITION	04	←	←	←
F	095H	HIT	(82) : 50Hz H-WIDTH	40	←	←	←
F	09AH	VLIN	(90) : 50Hz V-LINEARITY	10	←	←	←
F	09DH	BELL	(F0) : BELL FILTER	01	←	←	←
S	09EH	TRP	(F1) : CROMA TRAP f0	02	←	←	←
F	0A3H	SBY	(F6) : SECAM B-Y	08	←	←	←
F	0A4H	SRY	(F7) : SECAM R-Y	08	←	←	←

S ... semi-fixed data area which is fixed by model. (Do not adjust in field service.)
F ... This item may require adjustments by models after initialization, when QA02 is replaced.

ADJUSTING THE DATA

1) Pressing of VOLUME ▲ or ▼ button will change the value of data in the range from 00H to FFH. The variable range depends on the adjusting item.

EXIT FROM SERVICE MODE

1) Press POWER button to turn off the TV once.

INITIALIZATION OF MEMORY DATA OF QA02

After replacing QA02, the following initialization is required.

1. Enter the service mode, then select any register item.
2. Press and hold the CALL button on the Remote, then press the CHANNEL ▲ button on the TV. The initialization of QA02 has been completed.
3. Check the picture carefully. If necessary, adjust any adjustment item above. Perform "AUTO search memory" on the owner's manual.

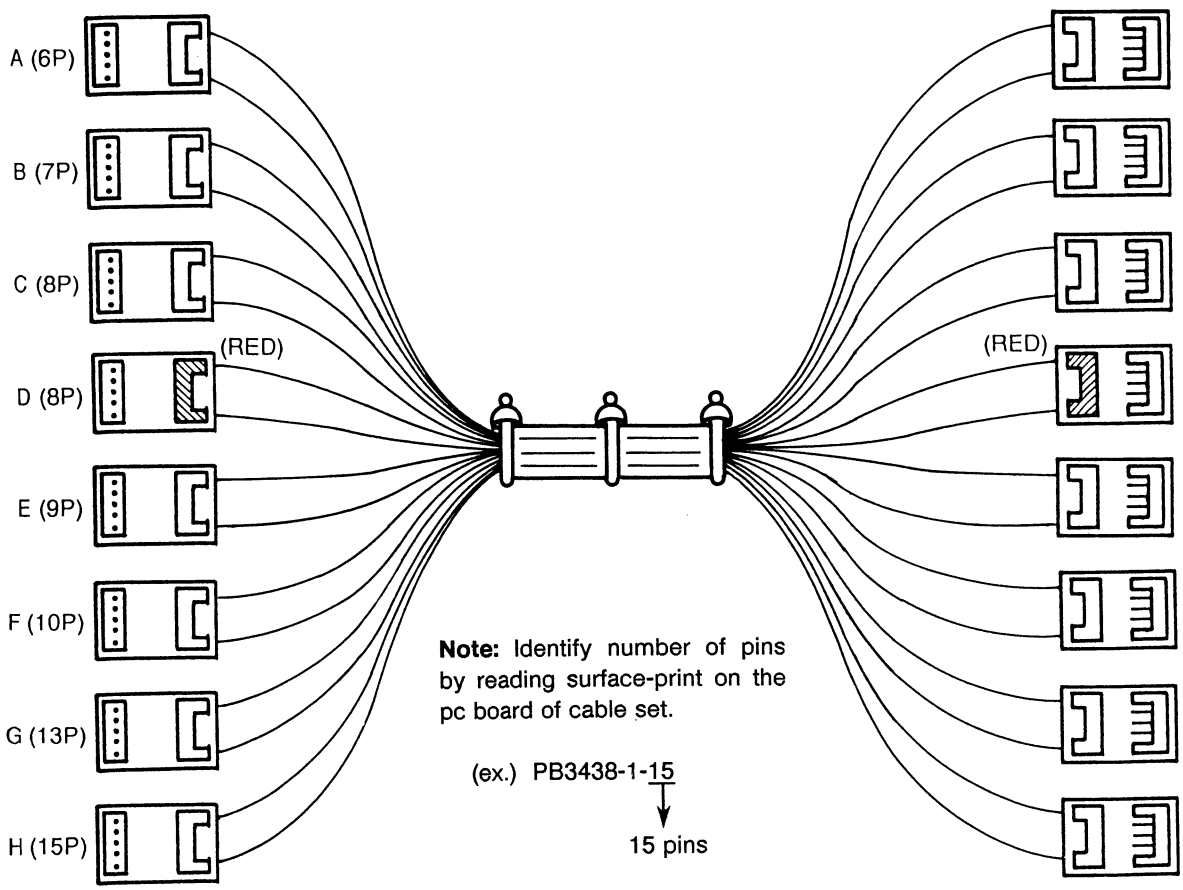
CAUTION: Never attempt to initialize the data unless QA02 has been replaced.

EXTENSION CABLE SET

1. Extention Cable Set is available for servicing modules of C2DB chassis.
   For C6S chassis, however, this cable is used only for TELETEXT (15 pin) modules.

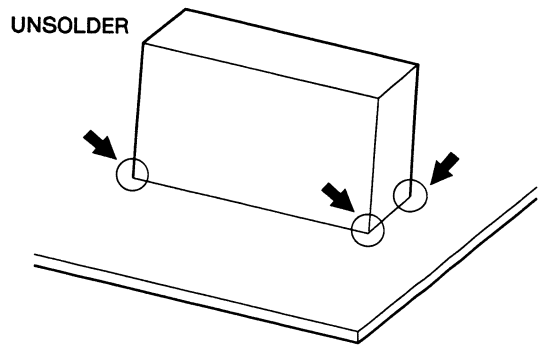
2. Identify number of pins by reading surface-print on the pc board of cable set.

Part No.	Description
23305270	Extension Cable Set

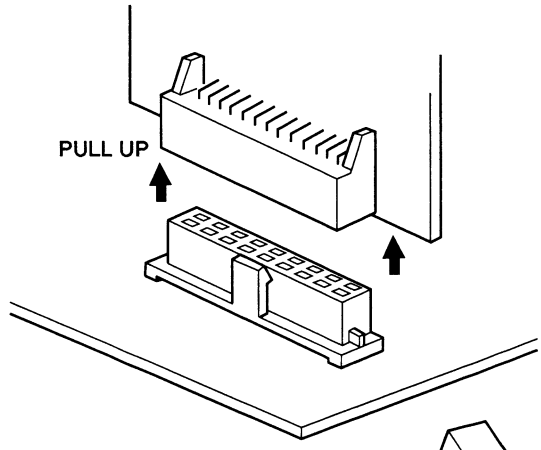


TO USE THE CABLE SET

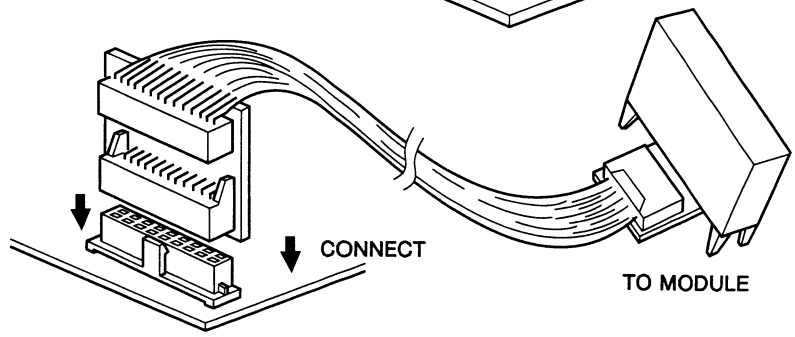
1. Unsolder corners on shielding case of module, which are marked with arrow in the figure.



2. Remove shielding case, and pull up module to disconnect.



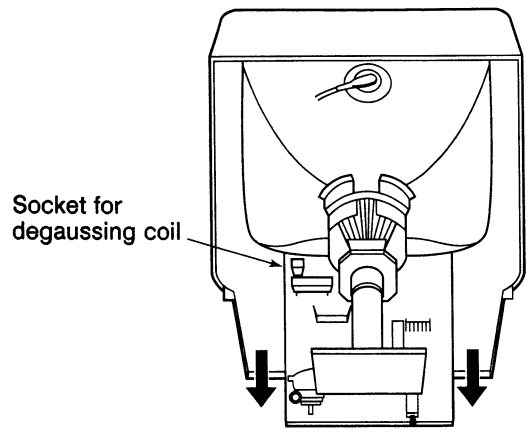
3. Connect Extension Cable Set to module and Main board.



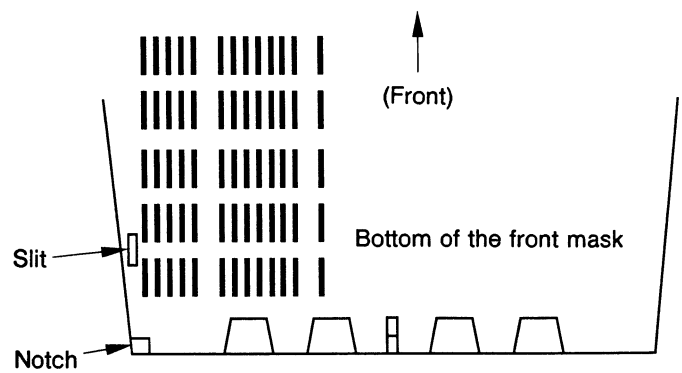
4. Reference chart of module and extension cable pin.

HOW TO MAKE THE CHASSIS STAND FOR REPAIR

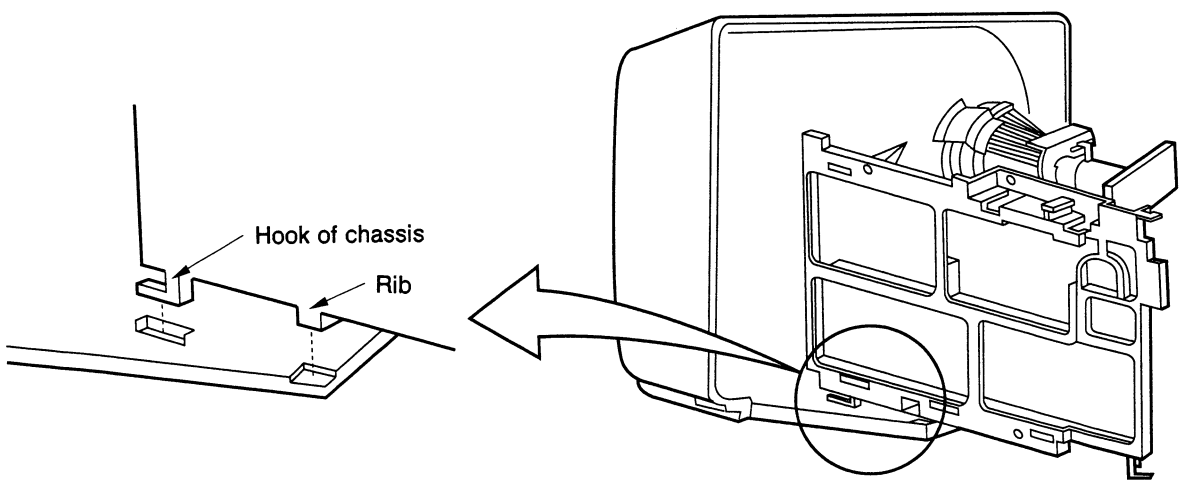
1. Remove socket of degaussing coil lead and the lead wires from holders of back board and draw out chassis.



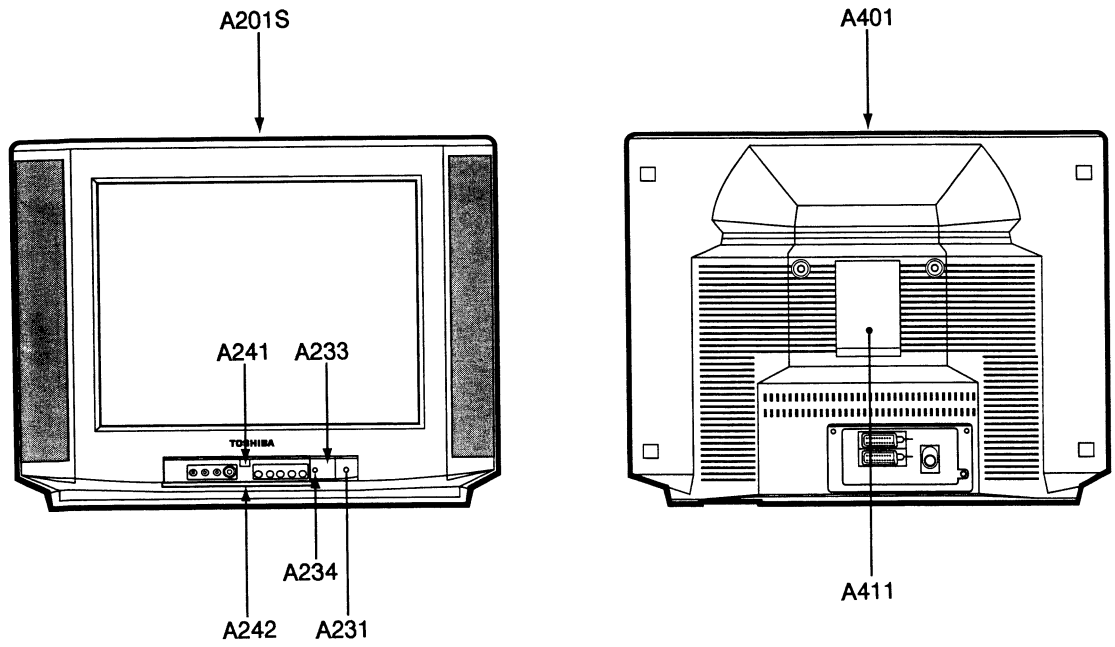
2. Lift up the chassis and insert the L-shape hook of chassis frame into the slit on bottom of front mask .



3. When restoring chassis, arrange wires and cables in the original positions.



CABINET REPLACEMENT PARTS LIST



Location No.	Part No.	Description
A201S	23410990	Front Cover
A231	23444871	Button, Power
A233	23430306	Lens (Remote)
A234	23430307	Piece (LED)
A241	70368125	Push Catch for Door
A242	23426842	Door
⚠A401	23426812	Back Cover
A411	23560154	Label, Model No.

CHASSIS REPLACEMENT PARTS LIST

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

CAUTION: The international hazard symbols " ⚠ " in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. The mounting position of replacements is to be identical with originals. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE on page 2. Do not degrade the safety of the receiver through improper servicing.

NOTICE:
- *The part number must be used when ordering parts, in order to assist in processing, be sure to include the Model number and Description.*
- *The PC board assembly with * mark is no longer available after the end of the production.*

ABBREVIATIONS:

Capacitors.....	CD : Ceramic Disk	PF : Plastic Film	EL : Electrolytic
Resistors.....	CF : Carbon Film	CC : Carbon Composition	MF : Metal Film
	OMF : Oxide Metal Film	VR : Variable Resistor	FR : Fusible Resistor

(All CD and PF capacitors are ±5%, 50V and all resistors, ±5%, 1/6W unless otherwise noted.)

Location No.	Part No.	Description
CAPACITORS		
C101	24797229	EL, 2.2μF, ±20%, 50V
C102	24794221	EL, 220μF, ±20%, 16V
C103	24794101	EL, 100μF, ±20%, 16V
C104	24232103	CD, 0.01μF, +80%, –20%
C105	24212102	CD, 1000pF, ±10%
C106	24669100	EL, 10μF, ±20%, 50V
C107	24793101	EL, 100μF, ±20%, 10V
C108	24793101	EL, 100μF, ±20%, 10V
C111	24669479	EL, 4.7μF, ±20%, 50V
C112	24669479	EL, 4.7μF, ±20%, 50V
C114	24474151	CD, 150pF, ±10%
C115	24797478	EL, 0.47μF, ±20%, 50V
C116	24797478	EL, 0.47μF, ±20%, 50V
C201	24794101	EL, 100μF, ±20%, 16V
C212	24590104	PF, 0.1μF
C213	24797100	EL, 10μF, ±20%, 50V
C214	24232103	CD, 0.01μF, +80%, –20%
C215	24794470	EL, 47μF, ±20%, 16V
C216	24797010	EL, 1μF, ±20%, 50V
C217	24797479	EL, 4.7μF, ±20%, 50V
C218	24590104	PF, 0.1μF
C220	24206108	EL, 0.1μF, 50V
C221	24206108	EL, 0.1μF, 50V
C222	24206108	EL, 0.1μF, 50V
C301	24617912	EL, 2.2μF, ±10%, 50V
C303	24212102	CD, 1000pF, ±10%
C304	24214471	CD, 470pF, ±10%, 500V
C305	24617912	EL, 2.2μF, ±10%, 50V
C306	24073057	EL, 1000μF, ±20%, 25V
C307	24082049	PF, 0.047μF, 100V
C308	24668221	EL, 220μF, ±20%, 35V
C309	24590102	PF, 1000pF
C310	24796102	EL, 1000μF, ±20%, 35V
C311	24214391	CD, 390pF, ±10%, 500V
C313	24082057	PF, 0.22μF, 100V
C314	24590563	PF, 0.056μF
C315	24797010	EL, 1μF, ±20%, 50V
C320	24668101	EL, 100μF, ±20%, 35V
C323	24538684	PF, 0.68μF
C324	24539334	PF, 0.33μF

Location No.	Part No.	Description
C341	24794101	EL, 100μF, ±20%, 16V
C402	24232103	CD, 0.01μF, +80%, –20%
C403	24590103	PF, 0.01μF
C404	24669010	EL, 1μF, ±20%, 50V
C406	24590104	PF, 0.1μF
C407	24232103	CD, 0.01μF, +80%, –20%
C409	24212221	CD, 220pF, ±10%
C410	24693472	PF, 4700pF, 100V
C413	24214222	CD, 2200pF, ±10%, 500V
C417	24214391	CD, 390pF, ±10%, 500V
C421	24794470	EL, 47μF, ±20%, 16V
C430	24232103	CD, 0.01μF, +80%, –20%
C431	24666221	EL, 220μF, ±20%, 16V
C432	24232103	CD, 0.01μF, +80%, –20%
C433	24794470	EL, 47μF, ±20%, 16V
C434	24665471	EL, 470μF, ±20%, 10V
C435	24666221	EL, 220μF, ±20%, 16V
C440	24082476	PF, 5600pF, ±3%, 1500V
C442	24082696	PF, 0.39μF, 250V
C444	24082469	PF, 3600pF, ±3%, 1500V
C445	24828563	PF, 0.056μF, 200V
C446	24700220	EL, 22μF, ±20%, 250V
C448	24640908	EL, 33μF, ±20%, 160V
C449	24795102	EL, 1000μF, ±20%, 25V
C463	24212152	CD, 1500pF, ±10%
C467	24082850	PF, 0.03μF, ±3%, 630V
C470	24666220	EL, 22μF, ±20%, 16V
C472	24538474	PF, 0.47μF
C501	24797479	EL, 4.7μF, ±20%, 50V
C502	24590103	PF, 0.01μF
C503	24797229	EL, 2.2μF, ±20%, 50V
C504	24590104	PF, 0.1μF
C505	24590104	PF, 0.1μF
C508	24353120	CD, 12pF
C509	24794100	EL, 10μF, ±20%, 16V
C510	24232103	CD, 0.01μF, +80%, –20%
C511	24794101	EL, 100μF, ±20%, 16V
C512	24232103	CD, 0.01μF, +80%, –20%
C513	24232103	CD, 0.01μF, +80%, –20%
C514	24590104	PF, 0.1μF
C515	24232103	CD, 0.01μF, +80%, –20%

Location No.	Part No.	Description
C610	24794100	EL, 10μF, ±20%, 16V
C612	24794470	EL, 47μF, ±20%, 16V
C661	24590102	PF, 1000pF
C662	24590102	PF, 1000pF
C663	24794100	EL, 10μF, ±20%, 16V
C670	24667470	EL, 47μF, ±20%, 25V
C671	24667470	EL, 47μF, ±20%, 25V
C673	24669229	EL, 2.2μF, ±20%, 50V
C676	24591124	PF, 0.12μF
C677	24591124	PF, 0.12μF
C678	24669229	EL, 2.2μF, ±20%, 50V
C679	24667470	EL, 47μF, ±20%, 25V
C681	24668102	EL, 1000μF, ±20%, 35V
C682	24668101	EL, 100μF, ±20%, 35V
C683	24668102	EL, 1000μF, ±20%, 35V
C684	24232103	CD, 0.01μF, +80%, −20%
C685	24232103	CD, 0.01μF, +80%, −20%
C686	24212102	CD, 1000pF, ±10%
C687	24212102	CD, 1000pF, ±10%
C688	24232103	CD, 0.01μF, +80%, −20%
⚠C801	24082363	PF, 0.22μF, ±20%, AC250V
C805	24092281	CD, 4700pF, ±20%, AC250V
C806	24092281	CD, 4700pF, ±20%, AC250V
C810	24086037	EL, 270μF, ±20%, 400V
⚠C813	24092457	CD, 2200pF, ±20%, AC400V
⚠C814	24092457	CD, 2200pF, ±20%, AC400V
C831	24794470	EL, 47μF, ±20%, 16V
C841	24796100	EL, 10μF, ±20%, 35V
C842	24794100	EL, 10μF, ±20%, 16V
C843	24590104	PF, 0.1μF
C846	24538224	PF, 0.22μF
C861	24214471	CD, 470pF, ±10%, 500V
C862	24082857	PF, 680pF, ±2%
C863	24590104	PF, 0.1μF
C864	24092474	CD, 220pF, ±10%, 2kV
C866	24669478	EL, 0.47μF, ±20%, 50V
C867	24590272	PF, 2700pF
C868	24676470	EL, 47μF, ±20%, 100V
C869	24678229	EL, 2.2μF, ±20%, 200V
C870	24820273	PF, 0.027μF, 630V
C871	24092345	CD, 1000pF, ±10%, 2kV
C873	24538224	PF, 0.22μF
C877	24667470	EL, 47μF, ±20%, 25V
C883	24538474	PF, 0.47μF
C884	24086953	EL, 220μF, ±20%, 160V
C885	24214471	CD, 470pF, ±10%, 500V
C886	24214471	CD, 470pF, ±10%, 500V
C889	24668222	EL, 2200μF, ±20%, 35V
C891	24082229	PF, 0.1μF, ±10%, 250V
C893	24092338	CD, 270pF, ±10%, 2kV
C894	24092338	CD, 270pF, ±10%, 2kV
C898	24212102	CD, 1000pF, ±10%
C901	24679479	EL, 4.7μF, ±20%, 250V
C902	24092345	CD, 1000pF, ±10%, 2kV
C941	24212561	CD, 560pF, ±10%
C942	24212471	CD, 470pF, ±10%
C943	24212391	CD, 390pF, ±10%
C971	24794220	EL, 22μF, ±20%, 16V
C972	24794100	EL, 10μF, ±20%, 16V
C980	24763471	EL, 470μF, ±20%, 16V
C981	24797479	EL, 4.7μF, ±20%, 50V
CA02	24474271	CD, 270pF, ±10%
CA33	24232103	CD, 0.01μF, +80%, −20%
CA36	24474101	CD, 100pF, ±10%

Location No.	Part No.	Description
CA37	24474101	CD, 100pF, ±10%
CA38	24474101	CD, 100pF, ±10%
CA42	24794100	EL, 10μF, ±20%, 16V
CA43	24232103	CD, 0.01μF, +80%, −20%
CA68	24794100	EL, 10μF, ±20%, 16V
CA69	24232103	CD, 0.01μF, +80%, −20%
CB01	24794470	EL, 47μF, ±20%, 16V
CB09	24794331	EL, 330μF, ±20%, 16V
CB10	24797010	EL, 1μF, ±20%, 50V
CB11	24212181	CD, 180pF, ±10%
CB12	24212561	CD, 560pF, ±10%
CB13	24212472	CD, 4700pF, ±10%
CB20	24212101	CD, 100pF, ±10%
CB21	24212221	CD, 220pF, ±10%
CC02	24212102	CD, 1000pF, ±10%
CG60	24794470	EL, 47μF, ±20%, 16V
CG61	24794101	EL, 100μF, ±20%, 16V
CG62	24232103	CD, 0.01μF, +80%, −20%
CG63	24085944	EL, 2.2μF, ±20%, 50V, Non-Polar
CG64	24085944	EL, 2.2μF, ±20%, 50V, Non-Polar
CG65	24085958	EL, 1.0μF, ±20%, 50V, Non-Polar
CG66	24085958	EL, 1.0μF, ±20%, 50V, Non-Polar
CG67	24590822	PF, 8200pF
CG68	24590822	PF, 8200pF
CG69	24590123	PF, 0.012μF
CG70	24590123	PF, 0.012μF
CG71	24232103	CD, 0.01μF, +80%, −20%
CG72	24232103	CD, 0.01μF, +80%, −20%
CG73	24203100	EL, 10μF, ±20%, 16V
CG74	24212102	CD, 1000pF, ±10%
CQ02	24797010	EL, 1μF, ±20%, 50V
CR01	24203100	EL, 10μF, ±20%, 16V
CR02	24203100	EL, 10μF, ±20%, 16V
CR03	24203100	EL, 10μF, ±20%, 16V
CR04	24203100	EL, 10μF, ±20%, 16V
CR05	24203100	EL, 10μF, ±20%, 16V
CS01	24085946	EL, 10μF, ±20%, 16V, Non-Polar
CS02	24085944	EL, 2.2μF, ±20%, 50V, Non-Polar
CS03	24085944	EL, 2.2μF, ±20%, 50V, Non-Polar
CS04	24206010	EL, 1μF, 50V
CS05	24206010	EL, 1μF, 50V
CS06	24206010	EL, 1μF, 50V
CS07	24206010	EL, 1μF, 50V
CS10	24203100	EL, 10μF, ±20%, 16V
CS11	24203100	EL, 10μF, ±20%, 16V
CS12	24474102	CD, 1000pF, ±10%
CS13	24474102	CD, 1000pF, ±10%
CS16	24474102	CD, 1000pF, ±10%
CS17	24474102	CD, 1000pF, ±10%
CS18	24474102	CD, 1000pF, ±10%
CS19	24474102	CD, 1000pF, ±10%
CT01	24590104	PF, 0.1μF
CT02	24353080	CD, 8pF, ±0.25pF
CT03	24353150	CD, 15pF
CT04	24474102	CD, 1000pF, ±10%
CT05	24590104	PF, 0.1μF
CT06	24590104	PF, 0.1μF

Location No.	Part No.	Description
CT07	24085944	EL, 2.2μF, ±20%, 50V, Non-Polar
CT08	24232103	CD, 0.01μF, +80%, -20%
CT09	24794101	EL, 100μF, ±20%, 16V
CT10	24473220	CD, 22pF
CT14	24794100	EL, 10μF, ±20%, 16V
CT15	24436101	CD, 100pF
CT16	24436220	CD, 22pF
CT96	24794470	EL, 47μF, ±20%, 16V
CV01	24797010	EL, 1μF, ±20%, 50V
CV02	24797010	EL, 1μF, ±20%, 50V
CV04	24202221	EL, 220μF, ±20%, 10V
CV05	24202221	EL, 220μF, ±20%, 10V
CV06	24794221	EL, 220μF, ±20%, 16V
CV07	24202221	EL, 220μF, ±20%, 10V
CV08	24202221	EL, 220μF, ±20%, 10V
CV20	24203100	EL, 10μF, ±20%, 16V
CV21	24203101	EL, 100μF, ±20%, 16V
CV22	24203100	EL, 10μF, ±20%, 16V
CV24	24232103	CD, 0.01μF, +80%, -20%
CV33	24232103	CD, 0.01μF, +80%, -20%
RESISTORS		
R101	24382183	OMF, 18k ohm, 1W
R210	24366271	CF, 270 ohm
R211	24366271	CF, 270 ohm
R212	24366271	CF, 270 ohm
R213	24366223	CF, 22k ohm
R214	24366824	CF, 820k ohm
R215	24366222	CF, 2200 ohm
R216	24366102	CF, 1k ohm
R217	24367102	CF, 1k ohm, ±2%
R218	24366562	CF, 5600 ohm
R228	24366153	CF, 15k ohm
R301	24366102	CF, 1k ohm
R303	24321109	MF, 1 ohm, 1/2W
R304	24366473	CF, 47k ohm
R305	24322159	OMF, 1.5 ohm, 1W
R306	24366393	CF, 39k ohm
R307	24366913	CF, 91k ohm
R308	24366102	CF, 1k ohm
R310	24552822	OMF, 8200 ohm, 1/2W
R313	24366183	CF, 18k ohm
R316	24366273	CF, 27k ohm
R327	24000577	FR, 5.6 ohm, 1W
R336	24383331	OMF, 330 ohm, 2W
R341	24366102	CF, 1k ohm
R342	24366562	CF, 5600 ohm
R343	24310159	MF, 1.5 ohm, 1/2W
R344	24366392	CF, 3900 ohm
R346	24366153	CF, 15k ohm
R401	24366104	CF, 100k ohm
R402	24366103	CF, 10k ohm
R403	24366472	CF, 4700 ohm
R405	24366104	CF, 100k ohm
R407	24366472	CF, 4700 ohm
R410	24366151	CF, 150 ohm
R411	24366561	CF, 560 ohm
R412	24552560	OMF, 56 ohm, 1/2W
R415	24382103	OMF, 10k ohm, 1W
R416	24019321	OMF, 1500 ohm, 5W
R421	24546129	FR, 1.2 ohm, 1/2W
R422	24366221	CF, 220 ohm
R430	24366103	CF, 10k ohm

Location No.	Part No.	Description
R432	24531560	FR, 56 ohm, 1/2W
R434	24552121	OMF, 120 ohm, 1/2W
R435	24366391	CF, 390 ohm
R436	24366561	CF, 560 ohm
R437	24366392	CF, 3900 ohm
R441	24532102	FR, 1k ohm, 1W
R447	24382472	OMF, 4700 ohm, 1W
R448	24338278	OMF, 0.27 ohm, 1W
R470	24338688	MF, 0.68 ohm, 1W
R471	24552820	OMF, 82 ohm, 1/2W
R479	24552820	OMF, 82 ohm, 1/2W
R501	24366103	CF, 10k ohm
R509	24366391	CF, 390 ohm
R510	24366391	CF, 390 ohm
R610	24366563	CF, 56k ohm
R612	24366103	CF, 10k ohm
R643	24552331	OMF, 330 ohm, 1/2W
R644	24552331	OMF, 330 ohm, 1/2W
R661	24366682	CF, 6800 ohm
R662	24366682	CF, 6800 ohm
R663	24366222	CF, 2200 ohm
R664	24366222	CF, 2200 ohm
R667	24366104	CF, 100k ohm
R668	24366103	CF, 10k ohm
R669	24366103	CF, 10k ohm
R676	24366229	CF, 2.2 ohm
R677	24366229	CF, 2.2 ohm
⚠R801	24009954	Metal-Glazed Resistor, 2.2M ohm, 1/2W
R808	24019340	PTC Thermistor, 18 ohm, 290V
R810	24568229	Cement, 2.2 ohm, 7W
R830	24323279	MF, 2.7 ohm, 2W
R831	24366331	CF, 330 ohm
R832	24383270	OMF, 27 ohm, 2W
R840	24531120	FR, 12 ohm, 1/2W
R842	24552472	OMF, 4700 ohm, 1/2W
R847	24366472	CF, 4700 ohm
R861	24382563	OMF, 56k ohm, 1W
R862	24381220	OMF, 22 ohm, 1/2W
R864	24366102	CF, 1k ohm
R866	24381390	OMF, 39 ohm, 1/2W
R868	24552103	OMF, 10k ohm, 1/2W
R870	24381820	OMF, 82 ohm, 1/2W
R871	24310109	MF, 1.0 ohm, 1/2W
R883	24552752	OMF, 7500 ohm, 1/2W
R884	24552752	OMF, 7500 ohm, 1/2W
R890	24381333	OMF, 33k ohm, 1/2W
R891	24366102	CF, 1k ohm
⚠R899	24005007	Metal-Glazed Resistor, 8.2M ohm, 1W
R901	24376472	CF, 4700 ohm, 1/2W
R902	24376472	CF, 4700 ohm, 1/2W
R903	24376472	CF, 4700 ohm, 1/2W
R911	24366101	CF, 100 ohm
R912	24366101	CF, 100 ohm
R913	24366101	CF, 100 ohm
R920	24000568	FR, 4.7 ohm, 1W
R921	24366471	CF, 470 ohm
R922	24366561	CF, 560 ohm
R923	24366821	CF, 820 ohm
R931	24366102	CF, 1k ohm
R932	24366102	CF, 1k ohm
R933	24366102	CF, 1k ohm

Location No.	Part No.	Description
R961	24554183	OMF, 18k ohm, 2W
R962	24554183	OMF, 18k ohm, 2W
R963	24554183	OMF, 18k ohm, 2W
R971	24366272	CF, 2700 ohm
R972	24366821	CF, 820 ohm
R973	24366681	CF, 680 ohm
R974	24366102	CF, 1k ohm
R980	24383220	OMF, 22 ohm, 2W
RA02	24366102	CF, 1k ohm
RA04	24366102	CF, 1k ohm
RA06	24366102	CF, 1k ohm
RA07	24366102	CF, 1k ohm
RA08	24366102	CF, 1k ohm
RA09	24366471	CF, 470 ohm
RA10	24366471	CF, 470 ohm
RA11	24366102	CF, 1k ohm
RA12	24366102	CF, 1k ohm
RA13	24366102	CF, 1k ohm
RA14	24366753	CF, 75k ohm
RA15	24366103	CF, 10k ohm
RA16	24366102	CF, 1k ohm
RA17	24366102	CF, 1k ohm
RA18	24366102	CF, 1k ohm
RA19	24366101	CF, 100 ohm
RA24	24366102	CF, 1k ohm
RA26	24366102	CF, 1k ohm
RA27	24366102	CF, 1k ohm
RA33	24366103	CF, 10k ohm
RA34	24366102	CF, 1k ohm
RA35	24366333	CF, 33k ohm
RA36	24366183	CF, 18k ohm
RA37	24366331	CF, 330 ohm
RA38	24366331	CF, 330 ohm
RA40	24366102	CF, 1k ohm
RA41	24366102	CF, 1k ohm
RA60	24366103	CF, 10k ohm
RA61	24366103	CF, 10k ohm
RA62	24366103	CF, 10k ohm
RA63	24366103	CF, 10k ohm
RA64	24366333	CF, 33k ohm
RA67	24366103	CF, 10k ohm
RA68	24366103	CF, 10k ohm
RA70	24366333	CF, 33k ohm
RA71	24366683	CF, 68k ohm
RA72	24366223	CF, 22k ohm
RA73	24366103	CF, 10k ohm
RA76	24366470	CF, 47 ohm
RA98	24366152	CF, 1500 ohm
RA99	24366152	CF, 1500 ohm
RB01	24366271	CF, 270 ohm
RB09	24366470	CF, 47 ohm
RB10	24366182	CF, 1800 ohm
RB11	24366103	CF, 10k ohm
RB12	24366333	CF, 33k ohm
RB13	24366564	CF, 560k ohm
RB14	24366123	CF, 12k ohm
RB15	24366392	CF, 3900 ohm
RB16	24366392	CF, 3900 ohm
RB18	24366471	CF, 470 ohm
RB19	24366223	CF, 22k ohm
RB20	24366823	CF, 82k ohm
RB22	24366103	CF, 10k ohm
RB26	24366103	CF, 10k ohm
RB27	24366103	CF, 10k ohm

Location No.	Part No.	Description
RB28	24366104	CF, 100k ohm
RB30	24366103	CF, 10k ohm
RB43	24366103	CF, 10k ohm
RB44	24366103	CF, 10k ohm
RB45	24366102	CF, 1k ohm
RB46	24366331	CF, 330 ohm
RC01	24531100	FR, 10 ohm, 1/2W
RG60	24366472	CF, 4700 ohm
RG61	24366472	CF, 4700 ohm
RG62	24366392	CF, 3900 ohm
RG63	24366392	CF, 3900 ohm
RG64	24366101	CF, 100 ohm
RG65	24366101	CF, 100 ohm
RG66	24366101	CF, 100 ohm
RG67	24366101	CF, 100 ohm
RG68	24366104	CF, 100k ohm
RQ02	24366103	CF, 10k ohm
RR01	24366101	CF, 100 ohm
RR02	24366101	CF, 100 ohm
RR03	24366101	CF, 100 ohm
RR04	24366472	CF, 4700 ohm
RR05	24366331	CF, 330 ohm
RR06	24366564	CF, 560k ohm
RR07	24366564	CF, 560k ohm
RR08	24366564	CF, 560k ohm
RR09	24366221	CF, 220 ohm
RR16	24366270	CF, 27 ohm
RR17	24366270	CF, 27 ohm
RR18	24366270	CF, 27 ohm
RR20	24366103	CF, 10k ohm
RR21	24366103	CF, 10k ohm
RR22	24366222	CF, 2200 ohm
RR23	24366563	CF, 56k ohm
RR24	24366510	CF, 51 ohm
RR25	24366472	CF, 4700 ohm
RR26	24366510	CF, 51 ohm
RR27	24366102	CF, 1k ohm
RR28	24366510	CF, 51 ohm
RR29	24366750	CF, 75 ohm
RR30	24366472	CF, 4700 ohm
RR31	24366472	CF, 4700 ohm
RR32	24366472	CF, 4700 ohm
RR33	24366103	CF, 10k ohm
RS01	24366104	CF, 100k ohm
RS02	24366681	CF, 680 ohm
RS03	24366104	CF, 100k ohm
RS04	24366681	CF, 680 ohm
RS05	24366103	CF, 10k ohm
RS06	24366103	CF, 10k ohm
RS10	24366223	CF, 22k ohm
RS11	24366223	CF, 22k ohm
RS12	24366223	CF, 22k ohm
RS13	24366223	CF, 22k ohm
RS14	24366101	CF, 100 ohm
RS15	24366101	CF, 100 ohm
RS17	24366472	CF, 4700 ohm
RS18	24366472	CF, 4700 ohm
RS19	24366101	CF, 100 ohm
RS20	24366222	CF, 2200 ohm
RS21	24366101	CF, 100 ohm
RS22	24366222	CF, 2200 ohm
RT01	24366332	CF, 3300 ohm
RT02	24366102	CF, 1k ohm
RT03	24366101	CF, 100 ohm

Location No.	Part No.	Description
RT04	24366273	CF, 27k ohm
RT05	24366103	CF, 10k ohm
RT07	24366102	CF, 1k ohm
RT08	24366122	CF, 1200 ohm
RT09	24366102	CF, 1k ohm
RT15	24366101	CF, 100 ohm
RT16	24366101	CF, 100 ohm
RT17	24366102	CF, 1k ohm
RT18	24366152	CF, 1500 ohm
RT19	24366122	CF, 1200 ohm
RT20	24366471	CF, 470 ohm
RT36	24366331	CF, 330 ohm
RT37	24366331	CF, 330 ohm
RT38	24366331	CF, 330 ohm
RT93	24366122	CF, 1200 ohm
RT94	24366122	CF, 1200 ohm
RT95	24366122	CF, 1200 ohm
RT96	24366102	CF, 1k ohm
RT97	24366102	CF, 1k ohm
RT98	24366102	CF, 1k ohm
RT99	24366102	CF, 1k ohm
RV02	24366101	CF, 100 ohm
RV04	24366750	CF, 75 ohm
RV05	24366750	CF, 75 ohm
RV06	24366750	CF, 75 ohm
RV07	24366750	CF, 75 ohm
RV10	24366101	CF, 100 ohm
RV11	24366472	CF, 4700 ohm
RV12	24366101	CF, 100 ohm
RV13	24366472	CF, 4700 ohm
RV14	24366101	CF, 100 ohm
RV19	24366151	CF, 150 ohm
RV20	24366123	CF, 12k ohm
RV22	24366123	CF, 12k ohm
RV24	24366102	CF, 1k ohm
RV25	24366102	CF, 1k ohm
RV30	24366271	CF, 270 ohm
RV31	24366101	CF, 100 ohm
RV32	24366271	CF, 270 ohm
RV33	24366101	CF, 100 ohm
RV37	24366151	CF, 150 ohm
RV60	24366183	CF, 18k ohm
RV83	24366332	CF, 3300 ohm
RV84	24366102	CF, 1k ohm
RV85	24366102	CF, 1k ohm
RV87	24366332	CF, 3300 ohm
RV88	24366102	CF, 1k ohm
RV89	24366102	CF, 1k ohm
RV90	24366101	CF, 100 ohm
RV91	24366101	CF, 100 ohm
COILS & TRANSFORMERS		
L211	23289101	Coil, Peaking, TRF4101AF
L301	23103859	Coil (Ferrite Bead), TEM2011
L302	23289330	Coil, Peaking, TRF4330AF
L430	23289470	Coil, Peaking, TRF4470AF
L431	23289100	Coil, Peaking, TRF4100AF
L441	23233070	Coil, Linearity, TLN2111G
L462	----------	DY, Supplied with V901
L503	23289100	Coil, Peaking, TRF4100AF
L505	23289100	Coil, Peaking, TRF4100AF
L805	23248150	Coil, Choke, TLN3427
L806	23248150	Coil, Choke, TLN3427
L861	23103859	Coil (Ferrite Bead), TEM2011

Location No.	Part No.	Description
L862	23103937	Coil (Ferrite Bead), TEM2004
L883	23103859	Coil (Ferrite Bead), TEM2011
L884	23103859	Coil (Ferrite Bead), TEM2011
L885	23248073	Coil, Choke, TLN3299D
L886	23103859	Coil (Ferrite Bead), TEM2011
L887	23280016	Coil, Peaking, TRF4100AZ
L888	23103859	Coil (Ferrite Bead), TEM2011
⚠L901	23200205	Coil, Degaussing, TSB-2333AR
LA01	23289100	Coil, Peaking, TRF4100AF
LT01	23289339	Coil, Peaking, TRF43R3AF
LT02	23238562	Coil, Peaking, TRF4109AJ
LT03	23289150	Coil, Peaking, TRF4150AF
LT04	23238714	Coil, Peaking, TRF4100AJ
LT05	23238714	Coil, Peaking, TRF4100AJ
LT06	23238714	Coil, Peaking, TRF4100AJ
LT07	23238714	Coil, Peaking, TRF4100AJ
LT08	23103859	Coil (Ferrite Bead), TEM2011
LT10	23238506	Coil, Peaking, TRF4229AJ
LT12	23238506	Coil, Peaking, TRF4229AJ
LT13	23238506	Coil, Peaking, TRF4229AJ
LT15	23238710	Coil, Peaking, TRF4220AJ
LT97	23238714	Coil, Peaking, TRF4100AJ
LT98	23238714	Coil, Peaking, TRF4100AJ
LT99	23238714	Coil, Peaking, TRF4100AJ
T401	23224983	Transformer, Horiz. Drive, TLN1039
⚠T461	23236510	Transformer, Flyback, TFB4123BE
T801	23211858	Line Filter, TRF3139
⚠T862	23217346	Transformer, Converter, TPW3365AR
SEMICONDUCTORS		
Q205	A6534053	Transistor, 2SA1015-Y(TE
Q301	B0377890	IC, TA8403K
Q303	A6002040	Transistor, RN1204
Q304	A6002020	Transistor, RN1202
Q340	A6534053	Transistor, 2SA1015-Y(TE
Q402	A6330069	Transistor, 2SC2482 FA-1
Q404	23314375	Transistor, ON4409(508D)
Q421	23314141	Transistor, 2SC3852
Q430	23314141	Transistor, 2SC3852
Q431	A6317440	Transistor, 2SC1815-Y
Q501	23905779	IC, TB1229AN
Q608	A6342206	Transistor, 2SC2878-A(TE
Q609	A6342206	Transistor, 2SC2878-A(TE
Q610	B0376856	IC, TA8211AH
Q612	A6534053	Transistor, 2SA1015-Y(TE
Q801	23905432	IC, STR-Z2154
Q830	23314141	Transistor, 2SC3852
Q840	23318299	IC, L78MR05
⚠Q862	A8643108	Photo Coupler, TLP621(GR-LF
Q872	23314141	Transistor, 2SC3852
Q901	A6330059	Transistor, 2SC2482(C)
Q902	A6330059	Transistor, 2SC2482(C)
Q903	A6330059	Transistor, 2SC2482(C)
Q971	A6534053	Transistor, 2SA1015-Y(TE
Q980	A6330059	Transistor, 2SC2482(C)
QA01	23905780	IC, M37222M8-A81
QA02	23904665	IC, NM24C04EN
QA98	A6317440	Transistor, 2SC1815-Y
QA99	A6317440	Transistor, 2SC1815-Y
QB01	A6317440	Transistor, 2SC1815-Y
QB11	A6317440	Transistor, 2SC1815-Y

Location No.	Part No.	Description
QB12	A6534053	Transistor, 2SA1015-Y(TE
QB20	A6002010	Transistor, RN1201
QB21	A6317440	Transistor, 2SC1815-Y
QB30	A6317440	Transistor, 2SC1815-Y
QB40	A6317440	Transistor, 2SC1815-Y
QG60	23905560	IC, M62420SP
QR01	B0487584	IC, TC74HC4053AP
QR07	A6534053	Transistor, 2SA1015-Y(TE
QR08	A6534053	Transistor, 2SA1015-Y(TE
QR09	A6534053	Transistor, 2SA1015-Y(TE
QR10	A6734590	Transistor, 2SC752(G)TM-Y
QR11	A6317440	Transistor, 2SC1815-Y
QR12	A6317440	Transistor, 2SC1815-Y
QR13	A6317440	Transistor, 2SC1815-Y
QR14	A6317440	Transistor, 2SC1815-Y
QR15	A6317440	Transistor, 2SC1815-Y
QS01	A6342206	Transistor, 2SC2878-A(TE
QS02	A6342206	Transistor, 2SC2878-A(TE
QS03	A6317440	Transistor, 2SC1815-Y
QS04	A6317440	Transistor, 2SC1815-Y
QT01	23904899	IC, SAA5281ZP/E
QT04	A6534053	Transistor, 2SA1015-Y(TE
QT05	A6317440	Transistor, 2SC1815-Y
QT06	A6002010	Transistor, RN1201
QV01	23904747	IC, MM1250XD
QV07	A6534053	Transistor, 2SA1015-Y(TE
QV08	A6534053	Transistor, 2SA1015-Y(TE
QV13	A6534053	Transistor, 2SA1015-Y(TE
QV14	A6534053	Transistor, 2SA1015-Y(TE
QV20	A6317440	Transistor, 2SC1815-Y
D101	23115878	Diode, Zener, μPC574J, (L)
D201	23316686	Diode, Zener, MTZJ9.1A
D202	23316686	Diode, Zener, MTZJ9.1A
D203	23316686	Diode, Zener, MTZJ9.1A
D204	23115599	Diode, 1N4148
D301	23118479	Diode, BYD33J
D303	23316794	Diode, SC570A
D308	23118479	Diode, BYD33J
D340	23316650	Diode, Zener, MTZJ2.4A
D401	23316684	Diode, Zener, MTZJ8.2B
D403	23316667	Diode, Zener, MTZJ4.7C
D406	23118479	Diode, BYD33J
D408	A7580658	Diode, 3JH41
D421	23316668	Diode, Zener, MTZJ5.1A
D422	23316666	Diode, Zener, MTZJ4.7B
D431	23316683	Diode, Zener, MTZJ8.2A
D440	23316254	Diode, ERC06-15
D441	23316688	Diode, Zener, MTZJ9.1C
D461	23118338	Diode, RU4AM
D610	23115599	Diode, 1N4148
D611	23115599	Diode, 1N4148
D612	23115599	Diode, 1N4148
D615	23115599	Diode, 1N4148
D616	23115599	Diode, 1N4148
D617	23115599	Diode, 1N4148
D618	23115599	Diode, 1N4148
D619	23115599	Diode, 1N4148
D801	23316391	Diode, D3SB60, 4109
D830	23316672	Diode, Zener, MTZJ5.6B
D845	23316686	Diode, Zener, MTZJ9.1A
D862	23118094	Diode, EU2A
D864	23118094	Diode, EU2A
D872	23316726	Diode, Zener, MTZJ15C
D875	23316719	Diode, Zener, MTZJ12B

Location No.	Part No.	Description
D876	23115599	Diode, 1N4148
D878	23316747	Diode, Zener, MTZJ27C
D880	23115599	Diode, 1N4148
D883	23316813	Diode, EG1
D884	23316813	Diode, EG1
D885	23316766	Diode, RU2YX
D886	23316766	Diode, RU2YX
D903	23115599	Diode, 1N4148
D904	23115599	Diode, 1N4148
D980	23115599	Diode, 1N4148
D981	23316554	Diode, 1SS146
D982	23316554	Diode, 1SS146
D983	23316554	Diode, 1SS146
DA11	23115599	Diode, 1N4148
DA12	23115599	Diode, 1N4148
DA36	23115599	Diode, 1N4148
DA42	23316675	Diode, Zener, MTZJ6.2B
DA61	23115599	Diode, 1N4148
DA62	23115599	Diode, 1N4148
DA69	23316675	Diode, Zener, MTZJ6.2B
DB01	23358504	LED, Red, SCL003URC3FX
DB30	23316673	Diode, Zener, MTZJ5,6C
DR01	23115599	Diode, 1N4148
DR02	23115599	Diode, 1N4148
DR03	23115599	Diode, 1N4148
DR04	23115599	Diode, 1N4148
DR06	23115599	Diode, 1N4148

MISCELLANEOUS

⚠F470	23144501	Fuse, 0.8A
F470A	23165433	Holder, Fuse
⚠F801	23144473	Fuse, 5.0A
F801A	23165433	Holder, Fuse
G101	23289101	Coil, Peaking, TRF4101AF
G106	23103859	Coil (Ferrite Bead), TEM2011
G410	23103859	Coil (Ferrite Bead), TEM2011
G616	24366102	CF, 1k ohm
G901	23289101	Coil, Peaking, TRF4101AF
G941	24366470	CF, 47 ohm
G942	24366680	CF, 68 ohm
G943	24366680	CF, 68 ohm
GS02	23289109	Coil, Peaking, TRF41R0AF
GS03	24366681	CF, 680 ohm
GS06	24366681	CF, 680 ohm
GS07	23289109	Coil, Peaking, TRF41R0AF
GS08	24366681	CF, 680 ohm
GS09	24366681	CF, 680 ohm
GS10	23289109	Coil, Peaking, TRF41R0AF
GS44	24366681	CF, 680 ohm
GS45	24366681	CF, 680 ohm
GT21	24366561	CF, 560 ohm
GT04	23115599	Diode, 1N4148
GT05	23115599	Diode, 1N4148
GT06	23115599	Diode, 1N4148
H002	23148270	Module, MVGS46A, IF MULTI
KB01	23904946	Remote Sensor, RPM-676CBR-S
P661	23363607	Headphone Jack, 3.5mm
P801	23372014	Power Cord
PV02	23363252	Pin Jack, Yellow
PV03	23365508	Jack, Phono
⚠S801	23344395	Switch, Power
SA01	23145430	Switch, Push, 1C1P
SA02	23145430	Switch, Push, 1C1P

Location No.	Part No.	Description
SA03	23145430	Switch, Push, 1C1P
SA04	23145430	Switch, Push, 1C1P
SA05	23145430	Switch, Push, 1C1P
⚠V901A	23902067	Socket, CRT, 10P
W661	23351116	Speaker, SPK-1382, 60x120mm, 8 ohm
W662	23351116	Speaker, SPK-1382, 60x120mm, 8 ohm
X501	23153438	Crystal, 16.2
XA01	23153325	Ceramic Resonator, 8.00M, TCR1056
XT01	23153457	Crystal, 27MHz
Z801	23904997	IC, HIC1015
⚠Z830	23144536	Protector, PRF10005491, 125V, 1A
⚠Z860	23144539	Protector, PRF20005491, 125V, 2A
PC BOARD ASSEMBLIES		
*U902A	23705955	Main Board, PB6331D
*U903A	23705956	AV Board, PB6332D-1
*U903B	23705957	CRT Drive Board, PB6332D-2
*U903C	23705958	Text Board, PB6332D-3
PICTURE TUBE		
⚠V901	23312670	Picture Tube, A51EAL155X01
TUNER		
H001	23321159	Tuner, EGA11
ACCESSORIES		
K902	23306168	Remote Hand Unit, CT-9859
Y101	23562867	Owner's Manual, Spanish, 2163DN
Y102	23562868	Owner's Manual, Finnish, 2163DN
Y103	23562869	Owner's Manual, Nowegian, 2163DN
Y104	23562870	Owner's Manual, Polish, 2163DN

Location No.	Part No.	Description

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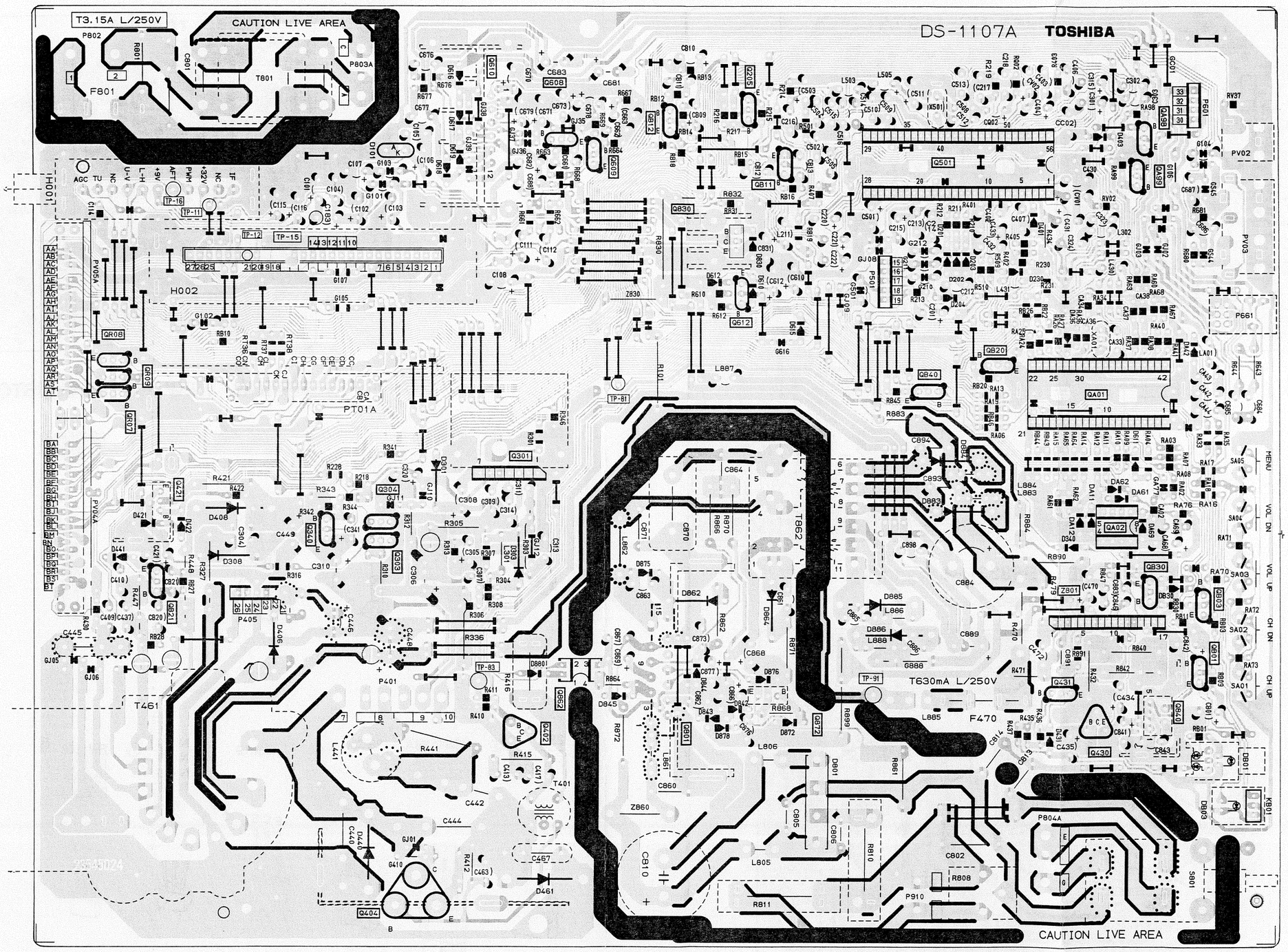
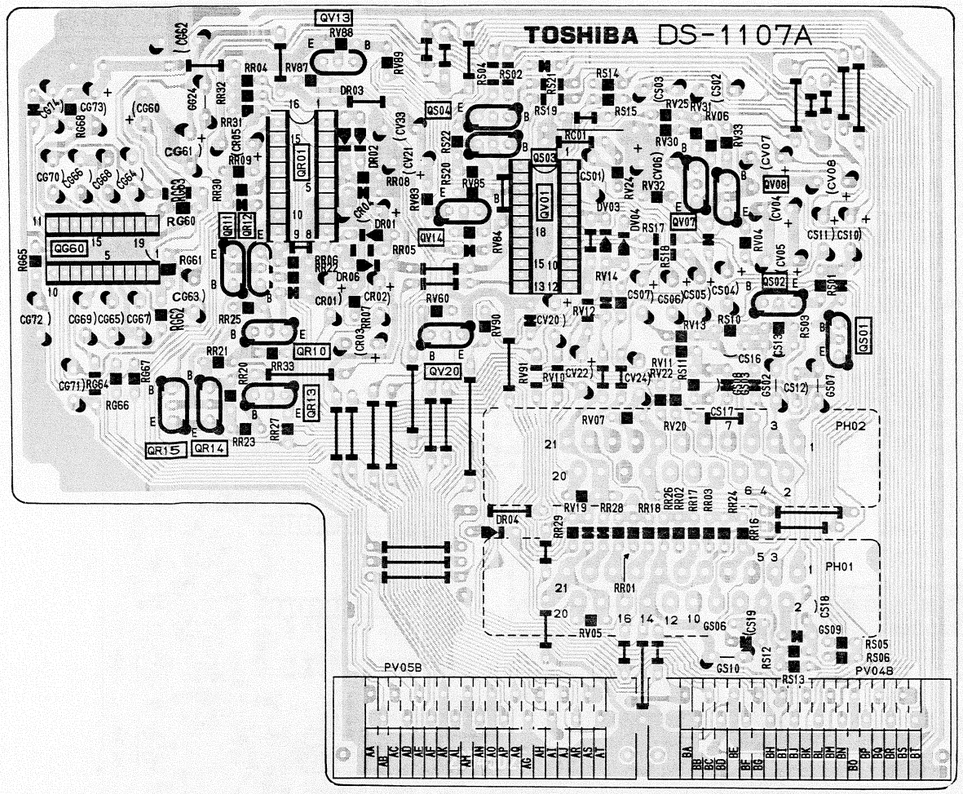
MAIN BOARD PB6331D

BOTTOM (FOIL) SIDE



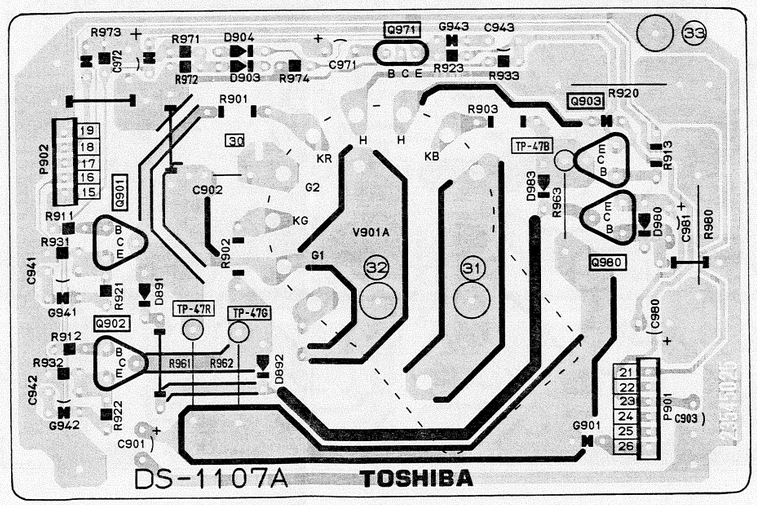
AV BOARD PB6332D-1

BOTTOM (FOIL) SIDE



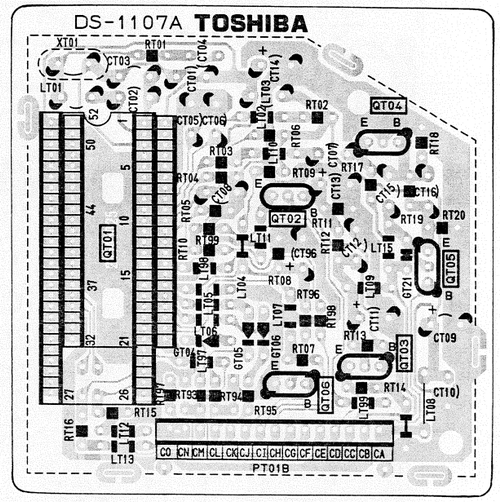
CRT DRIVE BOARD PB6332D-2

BOTTOM (FOIL) SIDE



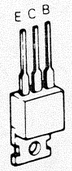
TELETEXT BOARD PB6332D-3

BOTTOM (FOIL) SIDE

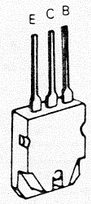


TERMINAL VIEW OF TRANSISTORS

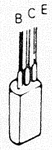
① 2SC1569



② 2SC3927(A)

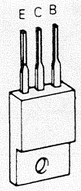


③ 2SC2580-C
2SC2655

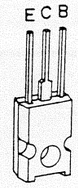


④ 2SA933S
2SA1015-Y
2SA1320-Y
2SC752GTM
2SC1685-Q
2SC1740S
2SC1815-N
2SC1959-Y
2SC2120-Y
2SC2878-A

⑤ 2SB1186A
2SC3852
2SD2253

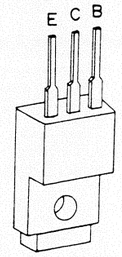


⑥ 2SC3619



⑦ RN1203
RN1204
RN1206
RN2004

⑧ 2SB1186A
2SD1763A



SPECIFICATIONS

Input Power Rating:	85 W, AC 220 ~ 240 V, 50 Hz
Aerial Input Impedance:	75 ohm unbalanced type for VHF, UHF and CATV
Receiving Channels:	**PAL B/G Standard, SECAM B/G Standard:** VHF ..... channels 2 to 4, 5 to 12 and S1 to S20, S21 to S41 UHF ..... channels 21 to 69
Intermediate Frequencies:	Picture I-F carrier frequency ..... 38.9 MHz (B/G) Sound I-F carrier frequency ..... 33.4 MHz (B/G)
Picture Tube:	21 inches, A51EAL55X01 or A51ES43VX69, 510 mm (measured on diagonal of viewable picture area), 90° deflection
Sound Output:	10.0 W x 2 (at 10% Distortion)
Speakers:	120 mm x 60 mm oval, 2 pcs
Aux. Terminals:	21 pin socket (FULL), S-VIDEO, VIDEO/AUDIO INPUT socket
Dimensions:	Height 483 mm Width 632 mm Depth 485 mm
Mass:	21.4 kg
Features:	Video input of multi system, OFF-timer, NICAM DIGITAL STEREO

Specifications are subject to change without notice.

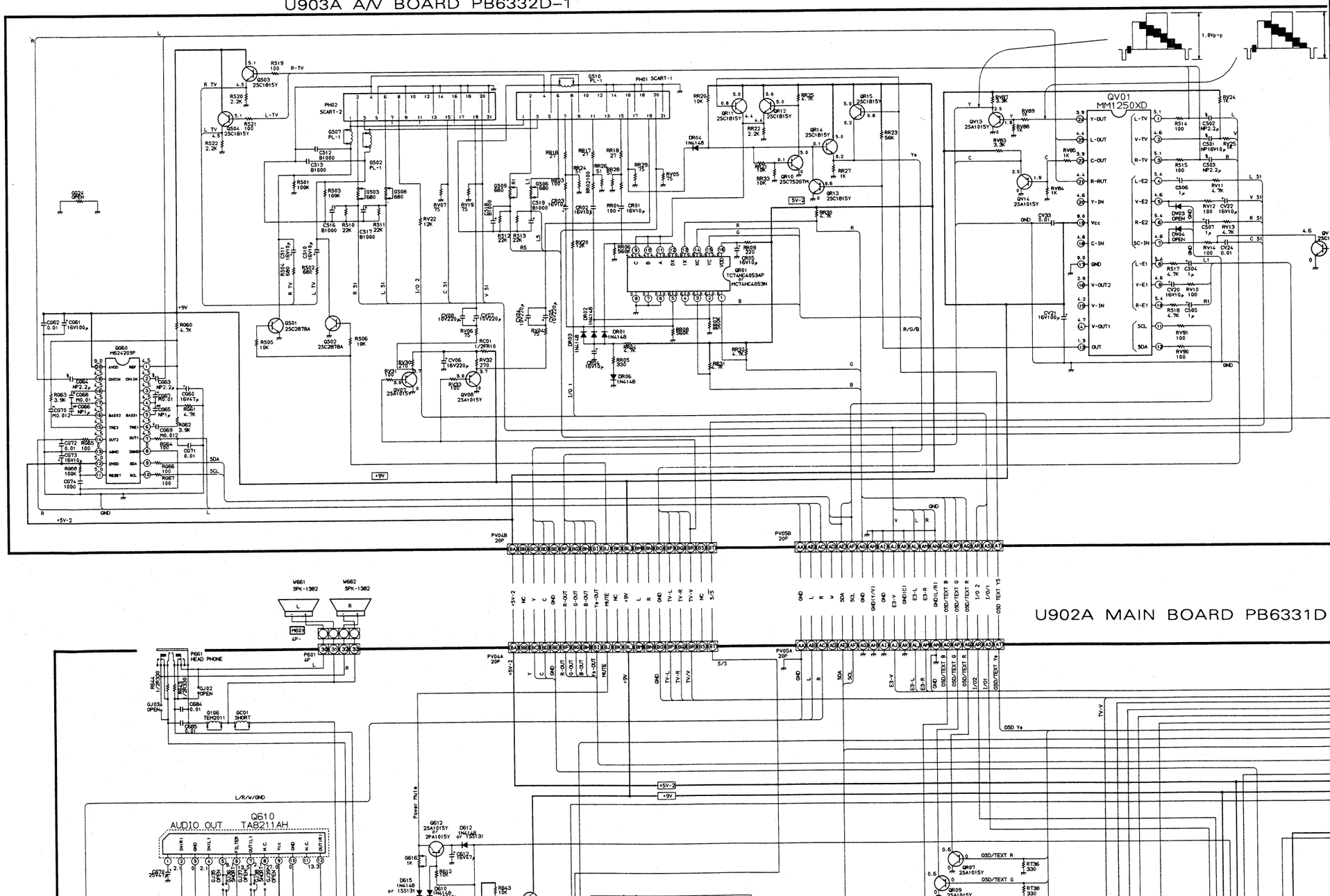
SCHEMATIC DIAGRAM MODEL: 2163DN

CAUTION: The international hazard symbols "⚠" in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. The mounting position of replacements is to be identical with originals. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE on page 2. Do not degrade the safety of the receiver through improper servicing.

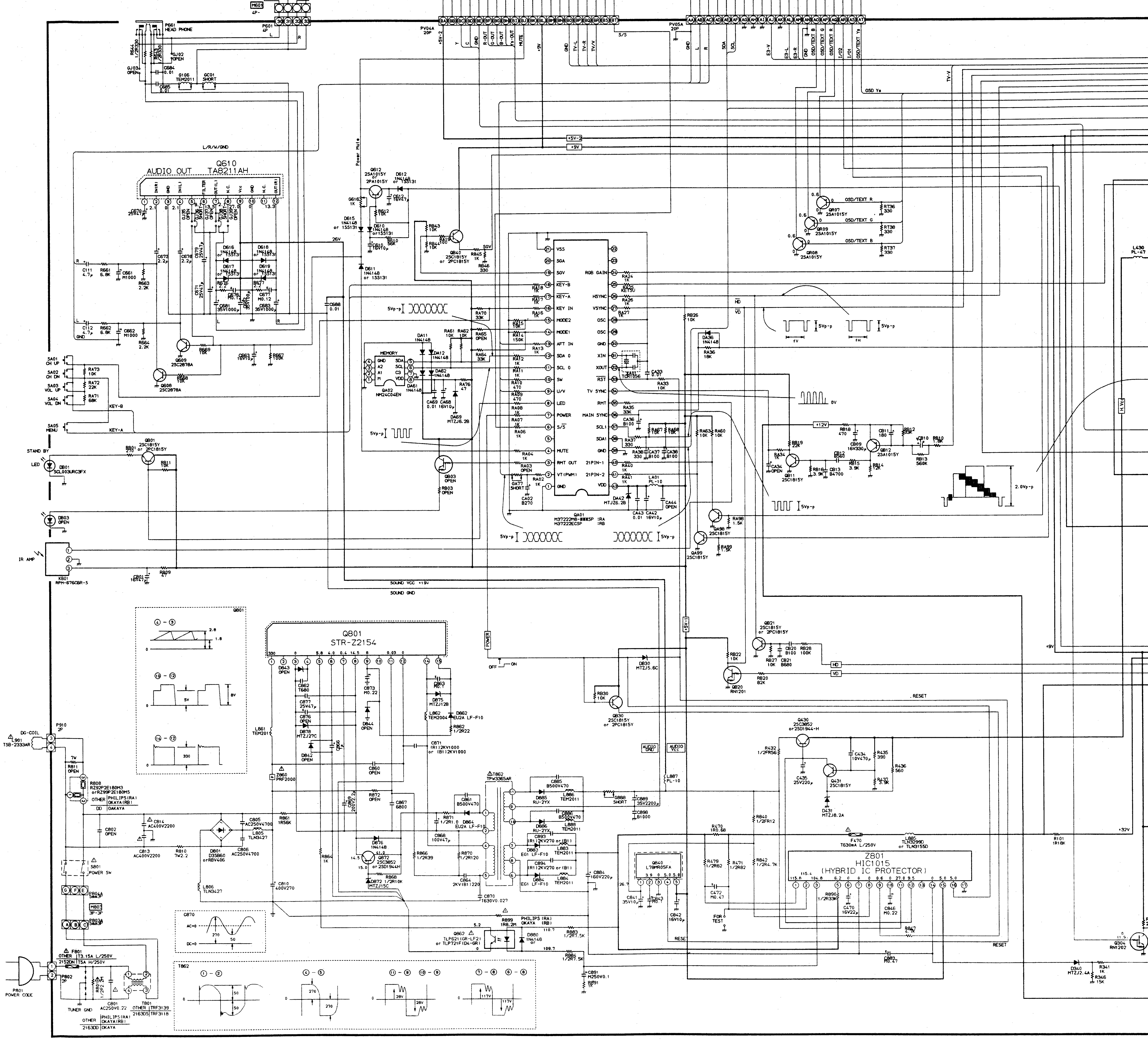
OBSERVATION OF VOLTAGES AND WAVEFORMS

1. Voltages read with VTVM from point shown to chassis ground, line voltage 220 volts, colour bar signal. Voltages reading may vary ±20%.
2. All waveforms are taken using a wide band oscilloscope and a low capacity probe.
3. Waveforms are taken using a standard colour bar signal.
4. Make sure that CONTRAST and COLOUR controls are in mid position and BRIGHTNESS control is almost in maximum position. Set other controls for best picture.

U903A A/V BOARD PB6332D-1



U902A MAIN BOARD PB6331D



M601 4P-
P661 HEAD PHONE
P601 4P
PV04A 20P
+5V-2
Y
C
GND
R-OUT
G-OUT
B-OUT
Ys-OUT
MUTE
+9V
TV-L
TV-R
TV/V
S/S
PV05A 20P
L
R
SDA
SCL
E3-V
E3-L
E3-R
OSD/TEXT B
OSD/TEXT G
OSD/TEXT R
I/02
I/01
OSD/TEXT Ys
OSD Ys
TV-V
R644 1/2R330
R643 1/2R330
GJ02 OPEN
GJ03 OPEN
C684 0.01
C685 0.01
G106 TEM2011
GC01 SHORT
L/R/W/GND
Q610
AUDIO OUT TA8211AH
IN(R)
GND
IN(L)
FILTER
OUT(L)
N.C.
Vcc
OUT(R)
C670 25V47μ
C673 2.2μ
C678 2.2μ
C679 25V47μ
C671 25V47μ
D616 1N4148 or 1SS131
D617 1N4148 or 1SS131
D618 1N4148 or 1SS131
D619 1N4148 or 1SS131
R676 2.2
R677 2.2
C676 M0.12
C677 M0.12
C681 35V1000μ
C683 35V1000μ
C111 4.7μ
R661 6.8K
C661 M1000
R663 2.2K
C112 4.7μ
R662 6.8K
C662 M1000
R664 2.2K
GND
Q609 2SC2878A
R669 10K
Q608 2SC2878A
R668 10K
C663 16V10μ
R667 100K
C688 0.01
26V
SA01 CH UP
SA02 CH DN
SA03 VOL UP
SA04 VOL DN
SA05 MENU
RA73 10K
RA72 22K
RA71 68K
KEY-B
KEY-A
STAND BY
LED
DB01 SCL003URC3FX
QB01 2SC1815Y or 2PC1815Y
RB01 270
RB11 10K
DB03 OPEN
IR AMP
KB01 RPM-676CBR-S
CB01 16V47μ
RB09 47
Power Mute
Q612 2SA1015Y or 2PA1015Y
D612 1N4148 or 1SS131
G616 1K
C612 16V47μ
R612 10K
D615 1N4148 or 1SS131
D610 1N4148 or 1SS131
C610 16V10μ
R610 56K
D611 1N4148 or 1SS131
RB43 10K
RB44 10K
RA19 100
QB40 2SC1815Y or 2PC1815Y
RB45 1K
RB46 330
SGV
+5V-2
+9V
5Vp-p
RA70 33K
MEMORY
QA02 NM24C04EN
GND A2 A1 M SDA SCL C3 VDD
DA11 1N4148
DA12 1N4148
DA62 1N4148
DA61 1N4148
RA61 10K
RA62 10K
RA65 OPEN
RA64 33K
RA76 47
CA69 0.01
CA68 16V10μ
DA69 MTZJ6.2B
QB03 OPEN
RB03 OPEN
VSS SGA SGV KEY-B KEY-A KEY IN MODE2 MODE1 AFT IN SDA 0 SCL 0 SW U/V LED POWER S/S MUTE RMT OUT VT(PWM) GND
RGB GAIN HSYNC VSYNC OSC OSC GND XIN XOUT RST TV SYNC RMT MAIN SYNC SCL1 SDA1 GND 21PIN-1 21PIN-2 VDD
RA18 1K
RA17 1K
RA16 1K
RA15 10K
RA14 150K
RA13 1K
RA12 1K
RA11 1K
RA10 470
RA09 470
RA08 1K
RA07 1K
RA06 1K
RA04 1K
RA03 OPEN
RA02 1K
GA77 SHORT
CA02 B270
QA01 M37222M8-***SP :RA M37222ECSP :RB
RA24 1K
RA25 KETSU
RA26 1K
RA27 1K
XA01 TCR1056
CA33 0.01
RA33 10K
RA35 33K
CA36 B100
RA67 10K
RA68 10K
RA37 330
RA38 330
CA37 B100
CA38 B100
RA40 1K
RA41 1K
LA01 PL-10
DA42 MTZJ6.2B
CA43 0.01
CA42 16V10μ
CA44 OPEN
RB26 10K
HD
VD
DA36 1N4148
RA36 18K
RA63 10K
RA60 10K
fV
fH
0V
QR07 2SA1015Y
QR09 2SA1015Y
QR08 2SA1015Y
OSD/TEXT R
OSD/TEXT G
OSD/TEXT B
RT36 330
RT38 330
RT37 330
+12V
RB18 470
RB19 22K
RA34 1K
CA34 OPEN
QB11 2SC1815Y
RB16 3.9K
CB13 B4700
CB12 B560
RB15 3.9K
CB09 16V330μ
QB12 2SA1015Y
CB11 180
RB12 33K
RB14 12K
CB10
RB10 1.8K
RB13 560K
2.0Vp-p
L430 PL-47
H.Vcc
QA98 2SC1815Y
RA98 1.5K
QA99 2SC1815Y
RA99 1.5K
SOUND VCC +19V
SOUND GND
+5V-1
QB21 2SC1815Y or 2PC1815Y
RB22 10K
RB27 10K
CB20 B100
CB21 B680
RB28 100K
QB20 RN1201
RB20 82K
DB30 MTZJ5.6C
RB30 10K
QB30 2SC1815Y or 2PC1815Y
POWER
OFF ON
AUDIO GND
AUDIO Vcc
RESET
+9V
Q801
Q801 STR-Z2154
D843 OPEN
C862 T680
C877 25V47μ
C876 OPEN
D878 MTZJ27C
D842 OPEN
C866
C873 M0.22
D844 OPEN
C863 M0.1
D875 MTZJ12B
L862 TEM2004
D862 EU2A LF-F10
R862 1/2R22
C871 (R1)2KV1000 or (B1)2KV1000
L861 TEM201
C860 OPEN
Z860 PRF2000
R872 OPEN
C869 200V2.2M
C867 6800
R861 1R56K
C861 B500V470
R871 1/2R1.0
D864 EU2A LF-F10
C868 100V47μ
T862 TPW3365AR
D876 1N4148
Q872 2SC3852 or 2SD1944H
R868 1/2R10K
D872 MTZJ15C
R864 1K
R866 1/2R39
R870 1/2R120
C864 2KV(B1)220
C870 T630V0.027
C810 400V270
C885 B500V470
D885 RU-2YX
L886 TEM2011
C886 B500V470
D886 RU-2YX
L888 TEM2011
C893 (R1)2KV270 or (B1)
D883 EG1 LF-F10
L883 TEM2011
C894 (R1)2KV270 or (B1)
D884 EG1 LF-F10
L884 TEM2011
G888 SHORT
C889 35V2200μ
C898 B1000
L887 PL-10
C884 160V220μ
R899 1R8.2M
PHILIPS (RA) OKAYA (RB)
Q862 TLP621(GR-LF2) or TLP721F(D4-GR)
D880 1N4148
R883 1/2R7.5K
R884 1/2R7.5K
C891 M250V0.1
R891 1K
C870
AC=0
DC=0
T862
P910 2P
DG-COIL
L901 TSB-2333AR
R811 OPEN
7W
R808 RZ92P2E180M3 orRZ99P2E180M5
OTHER PHILIPS(RA) OKAYA(RB)
DD OAKAYA
C802 OPEN
C814 AC400V2200
C813 AC400V2200
R810 7W2.2
D801 D3SB60 orRBV406
C805 AC250V4700
L805 TLN3427
C806 AC250V4700
L806 TLN3427
S801 POWER SW
P804A 5mm3P
M803 3P-3P
P803A 5mm3P
F801
OTHER T3.15A L/250V
2152DN T5A H/250V
P802 2P
P801 POWER CODE
R801 1/2R2.2M
C801 AC250V0.22
TUNER GND
T801 OTHER TRF3139 2163DS TRF3118
OTHER PHILIPS(RA) OKAYA(RB)
2163DD OKAYA
Q840 L78MR05FA
C841 35V10μ
C843 M0.1
C842 16V10μ
Q430 2SC3852 or 2SD1944-H
R432 1/2FR56
C435 25V220μ
C434 10V470μ
R435 390
Q431 2SC1815Y
R437 3.3K
R436 560
D431 MTZJ8.2A
R840 1/2FR12
R470 1R0.68
F470 T630mA L/250V
L885 TLN3299D or TLN3155D
R101 1R18K
+32V
R479 1/2R82
R471 1/2R82
R842 1/2R4.7K
C472 M0.47
FOR TEST
Z801 HIC1015 (HYBRID IC PROTECTOR)
R890 1/2R33K
C470 16V22μ
C846 M0.22
R847 4.7K
C883 M0.47
Q304 RN1202
D340 MTZJ2.4A
R341 1K
R346 15K

ıe voltage 220

apacity probe.

position and
ıtrols for best

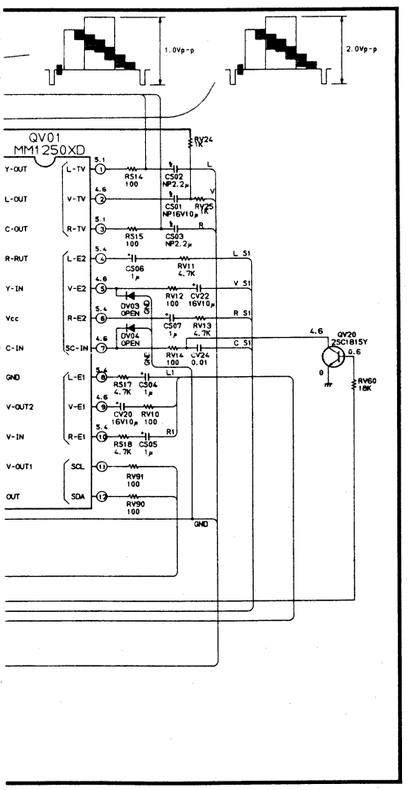
NOTES:

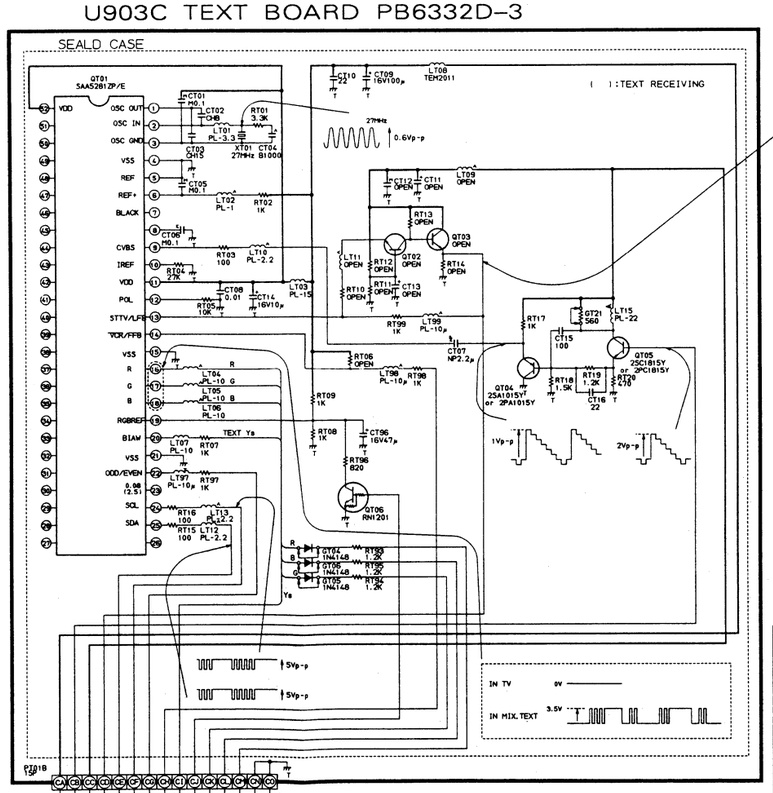
1. D.C. resistance value of a principal transformer is shown in this schematic diagram. These are measured for separated from the circuit.
2. The circuits are subject to change without notice.
3. ⬬ : Solder links.

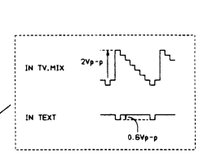
EXPRESSION

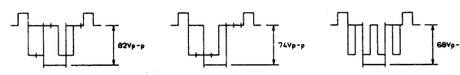
VALUE OF RESISTOR, CAPACITOR and INDUCTOR

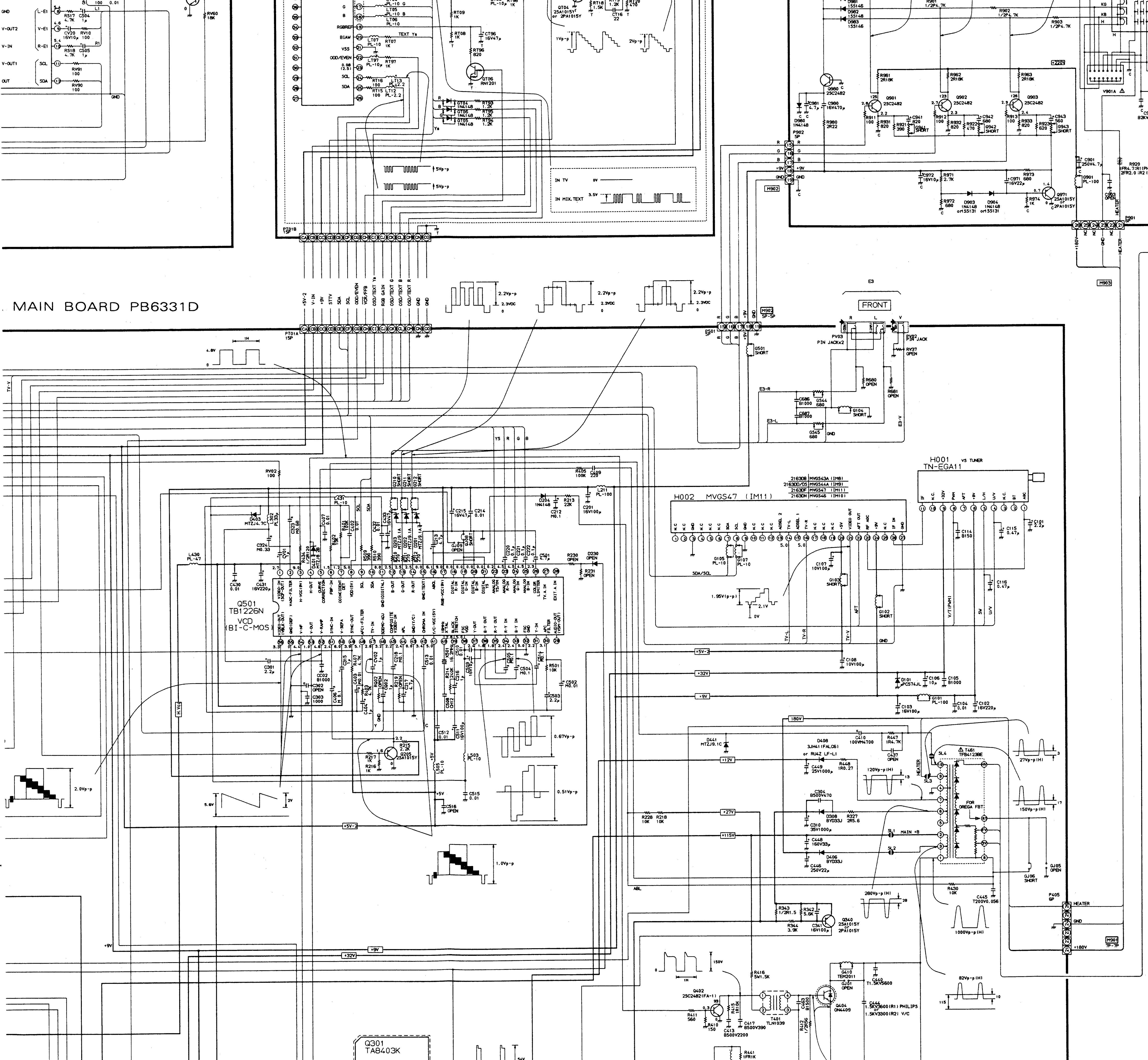
1. Resistance is shown in ohm, k=1,000, M=1,000,000
2. Unless other wise noted in schematic, all capacitor values less than 1 are expressed in μF and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH, and the values less than 1 in H.









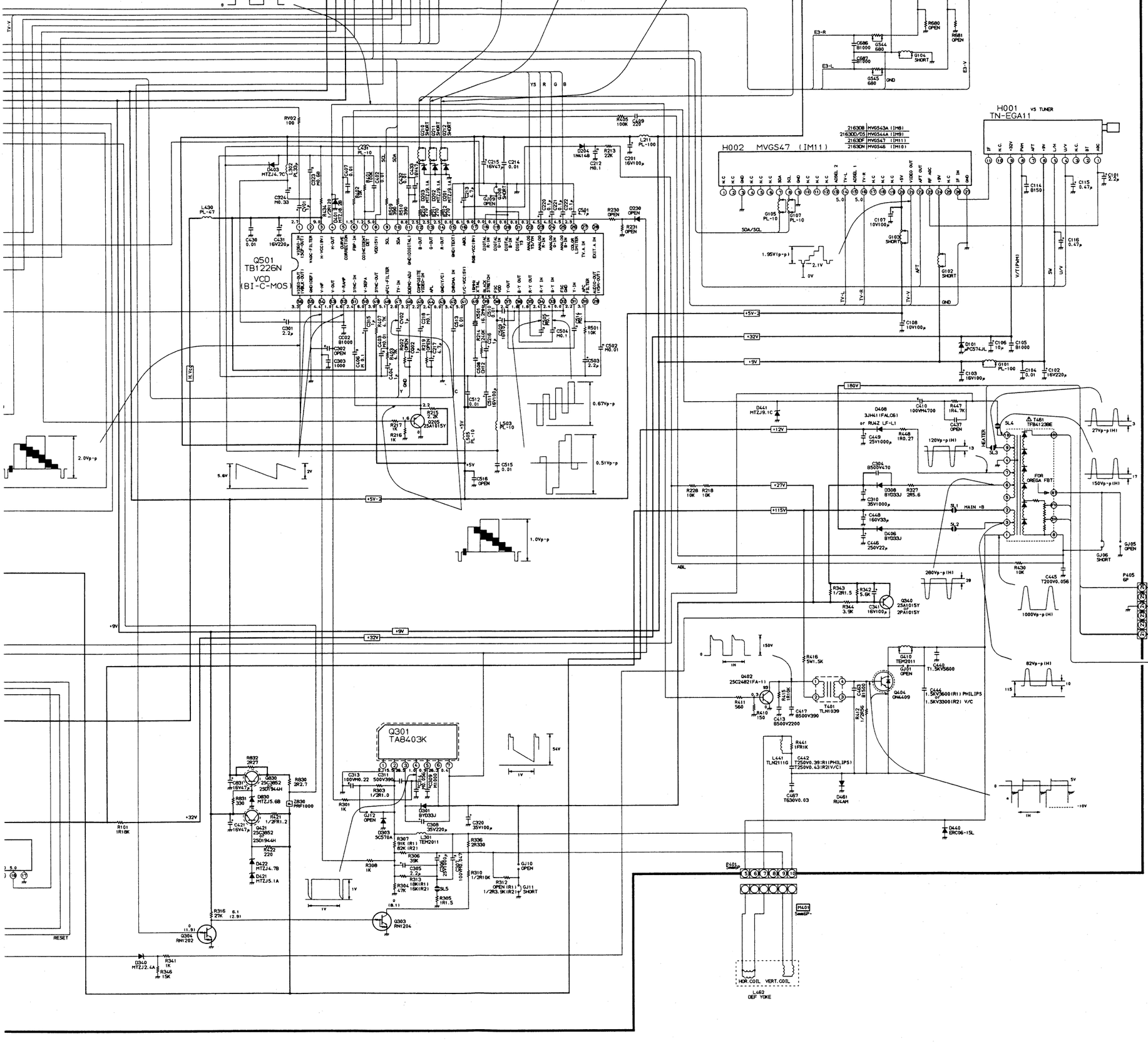


LIST OF DIFFERENCE OF EACH C.P.T.

	R1	R2
V901	A51EAL155X01 (PHILIPS)	A51EFS43X69 (VIDEO COLOUR)
C442	T250V0.39µF	T250V0.43µF
C444	1.5kV3600pF	1.5kV3300pF
R307	91kΩ	82kΩ
R312	OPEN	1/2R3.9kΩ
R313	18kΩ	16kΩ
R920	1FR4.7Ω	2FR2.0Ω

LIST OF DIFFERENCE FOR EACH MODELS

	2163DF	2163DB	2163DD	2163DN	2163DS
RA14	150kΩ	10kΩ	OPEN	75kΩ	43kΩ
RA15	10kΩ	←	←	←	←
RA64	33kΩ	OPEN	33kΩ	←	←
RA65	OPEN	←	←	←	←
H001	TN-EGA11 (TN7)	TN-UF811B (TN5)	TN-EGA11 (TN7)	←	←
H002	MVGS45 (IM11)	MVGS43A (IM8)	MVGS44A (IM9)	MVGS48 (IM10)	MVGS44A (IM9)
C801	PHILIPS(RA) OKAYA(RB)	←	OKAYA	PHILIPS(RA) OKAYA(RB)	←
T801	TRF3139	←	←	←	TRF3118
F801	T3.15A L/250V	←	←	T5A H/250V	T3.15A L/250V
Q862	TLP621(RA) TLP721F(RB)	←	←	TLP721F	TLP621(RA) TLP721F(RB)
R832	2R27	OPEN	←	2R27	OPEN
R830	2R2.7Ω	2R3.3Ω	←	2R2.7Ω	2R3.3Ω
Q501	TB1226N	TB1229N	←	←	TB1226N
RQ02	OPEN	10K	←	←	OPEN
CQ02	1µF	OPEN	←	←	1µF
GJ01	OPEN	←	←	←	←
GJ02	OPEN	←	←	←	←
GJ03	OPEN	←	←	←	←
GJ05	OPEN	←	←	←	←
GJ06	SHORT	←	←	←	←
GJ08	SHORT	←	←	←	←
GJ09	OPEN	←	←	←	←
GJ10	OPEN	←	←	←	←
GJ11	SHORT	←	←	←	←
GJ12	SHORT	←	←	←	←
GJ35	OPEN	←	←	←	←
GJ36	SHORT	←	←	←	←
GJ37	OPEN	←	←	←	←
GJ38	SHORT	←	←	←	←
GJ39	OPEN	←	←	←	←
G101	PL-100	←	←	←	←
G102	SHORT	←	←	←	←
G103	SHORT	←	←	←	←
G104	SHORT	←	←	←	←
G105	PL-10	SHORT	←	←	←
G106	TEM2011	←	←	←	←
G107	PL-10	SHORT	←	←	←
G210	SHORT	←	←	←	←
G211	SHORT	←	←	←	←
G212	SHORT	←	←	←	←
G410	TEM2011	←	←	←	←
G501	SHORT	←	←	←	←
G6'6	1KΩ	←	←	←	←
G888	SHORT	←	←	←	←
G901	PL-100	←	←	←	←
G941	SHORT	←	←	←	←
G942	SHORT	←	←	←	←
G943	SHORT	←	←	←	←
GA77	SHORT	←	←	←	←
GC01	SHORT	←	←	←	←
GG24	OPEN	←	←	←	←
GS02	PL-1	←	←	←	←
GS03	680Ω	←	←	←	←
GS06	680Ω	←	←	←	←
GS07	PL-1	←	←	←	←
GS08	680Ω	←	←	←	←
GS09	680Ω	←	←	←	←
GS10	PL-1	←	←	←	←
GS44	680Ω	←	←	←	←


H001 VS TUNER
TN-EGA11
H002 MVGS47 (IM11)
Q501
TB1226N
VCD
(BI-C-MOS)
Q301
TA8403K
Q303
RH1204
Q304
RH1202
Q402
2SC4882FA-11
Q404
DN4409
Q340
2SA1015Y
Q205
2SA1015Y
T401
TLN1039
T481
TFB4123BE
D408
3JH41(FALC6)
D441
HTZJ9.1C
D461
RU4M
D440
ERC06-15L
D501
HTZJ4.7C
D403
HTZJ4.7C
D340
HTZJ2.4A
D421
HTZJ5.1A
D422
HTZJ4.7B
D830
HTZJ5.6B
D101
HCS74JL
D201
BYD33J
D308
BYD33J
D306
BYD33J
D406
BYD33J
D204
1N4148
D393
SC510A
D408
3JH41(FALC6)
or RU4Z LF-L1
P405
6P
P401
SeaEP
M401
SeaEP
H901
7P-7P
HOR.COIL
VERT.COIL
L462
DEF YOKE
SL1 MAIN +B
SL2
SL3 HEATER
SL4
SL5
FOR OMEGA FBT
+5V-2
+32V
+9V
+12V
+27V
+115V
+180V
180V
RESET
ABL
AFT
TV-L
TV-R
TV-V
GND
SDA/SCL
HEATER
GND
2.0Vp-p
1.0Vp-p
0.67Vp-p
0.51Vp-p
1.95Vp-p
2.1V
0V
5.6V
2V
1V
54V
150Vp-p(H)
120Vp-p(H)
280Vp-p(H)
1000Vp-p(H)
82Vp-p(H)
27Vp-p(H)
150Vp-p(H)
1H
5V
-10V
115
10
20
3
17
19
93
0.3
9.4
5.0
2.1
2.2
1.6
0.8
1.2
2.4
3.3
4.6
4.0
2.5
6.0
5.1
3.9
3.4
5.8
1.8
2.0
2.6
2.7
2.8
3.0
3.1
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9.9
10.0